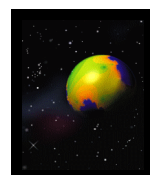


THE BIG ENDIANS;

OR,

USES OF THE SKY



ASTRONOMY

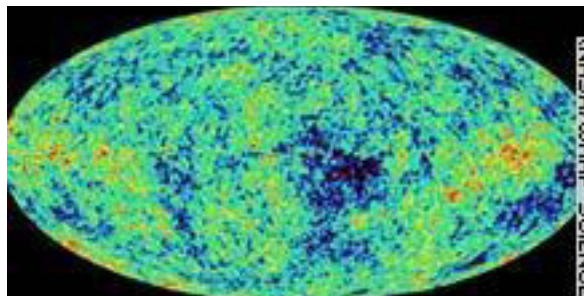
ASTRONOMY

"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER

"The Universe, as has been observed before, is an unsettlingly big place, a fact which for the sake of a quiet life most people tend to ignore. Many would happily move to somewhere smaller of their own devising, and this what most beings in fact do."

— Douglas Adams (from LIFE, THE UNIVERSE AND EVERYTHING, the 3rd book of the HITCHHIKER'S GUIDE TO THE GALAXY "trilogy in five parts")





ASTRONOMY

ASTRONOMY

Larry Klaes <lklaes@zoomtel.com> has inquired:

> What were Thoreau's views on astronomy?

I have responded as follows:

> Refer to Mary I. Kaiser's "'Conversing with the Sky':

> The Imagery of Celestial Bodies in Thoreau's Poetry,"

> THOREAU JOURNAL QUARTERLY 9 (1977):15-28 and Michael J.

> Crowe's EXTRATERRESTRIAL LIFE DEBATE 1750-1900, especially

> page 237 where suggestions as to his sources are

> provided.

Since I also am interested in astronomy, I have attempted to create a complete context for astronomical discoveries, and not only those occurring during Thoreau's lifetime, 1817-1862. The Kouroo project has a multiple-page file tracking for instance all comets that passed through the solar system during that period, and the public reaction to those apparitions. This file also tracks the discoveries of new planets and new satellites around these planets, discoveries of asteroids, views of the surface of Mars, theories of the origin of the earth's moon, etc. It is within this context that we situate Henry Thoreau's visit to the Harvard Observatory and his various interactions with the astronomers of his era, and his dealings with local Massachusetts people who had obtained astronomical telescopes, and his various remarks about astronomical bodies such as the Morning and Evening Star.

This is a whole lot of material to summarize, but, basically, Thoreau was interested in astronomical discovery but seems not himself to have any pronounced attitudes or beliefs other than this lively interest. He was not at all tempted to regard astronomical events as portents. He exhibited no tendency to confuse or conflate astronomy with astrology, a study in regard to which his affect was that of considered disdain. His interest in astronomy seems to have been oriented around just what one might expect, to wit, it was about the same as his reaction to new innovations in travel (the railroad) and in communication (the telegraph), where he focused upon the possibility of turning these new inventions and discoveries toward literary usefulness.

ASTRONOMY

ASTRONOMY

Basically, he looked upward for juicy and fruitful metaphors:

A WEEK: The sun-setting presumed all men at leisure, and in a contemplative mood; but the farmer's boy only whistled the more thoughtfully as he drove his cows home from pasture, and the teamster refrained from cracking his whip, and guided his team with a subdued voice. The last vestiges of daylight at length disappeared, and as we rowed silently along with our backs toward home through the darkness, only a few stars being visible, we had little to say, but sat absorbed in thought, or in silence listened to the monotonous sound of our oars, a sort of rudimental music, suitable for the ear of Night and the acoustics of her dimly lighted halls;

"Pulsae referunt ad sidera valles,"

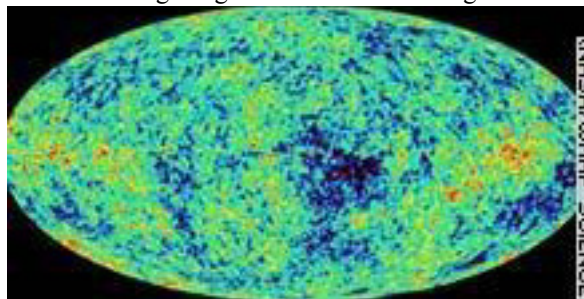
and the valleys echoed the sound to the stars.

As we looked up in silence to those distant lights, we were reminded that it was a rare imagination which first taught that the stars are worlds, and had conferred a great benefit on mankind. It is recorded in the Chronicle of Bernaldez, that in Columbus's first voyage the natives "pointed towards the heavens, making signs that they believed that there was all power and holiness." We have reason to be grateful for celestial phenomena, for they chiefly answer to the ideal in man. The stars are distant and unobtrusive, but bright and enduring as our fairest and most memorable experiences. "Let the immortal depth of your soul lead you, but earnestly extend your eyes upwards."

ASTRONOMY

13,000,000,000 BCE

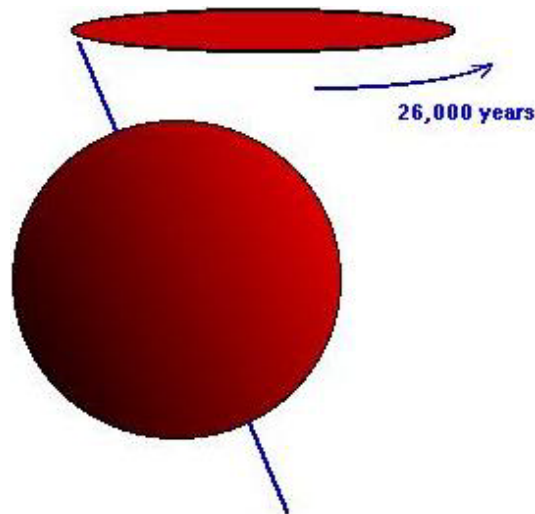
circa 13,000,000,000 BCE: There was this big bang — we've been waiting ever since, for the other shoe to drop.



24,000 BCE

circa 24,000 BCE: At this point the precession of the planet Earth was such that Polaris was its pole star.

The Earth's axis precesses (it is like a wobbling top) in a 26,000-year cycle. This cycle known as precession is caused by the gravitational attraction of the sun and the moon, acting on the fact that the planet Earth is not quite spherical. In about 14,000 years, Vega (the brightest star in the constellation Lyra) would become the North Star, and then in another 5,000 years it would be Alpha Cephei (the brightest star in the constellation Cepheus), and in the time of the Pharaohs of [Egypt](#), the pole star would be Thuban (the brightest star in the constellation Draco), but at the completion of the entire cycle of 26,000 years –in our current era known as civilization– it would come to be Polaris again.



ASTRONOMY

18,000 BCE-8,000 BCE

A gigantic and exceedingly bright [comet](#) known only as “The Kreutz Sungrazer Parent” evidently whipped around the sun in a close arc on some date and then disintegrated into a swarm of lesser sungrazing comets due to the tugs of gravitational attraction. Brian Marsden has opined that perhaps the two halves of the original split of this comet might have persisted until, respectively, → 371 BCE (a comet mentioned by Aristotle) and 1106 CE, → disintegrating further on those visits into at least three pieces each.

ASTRONOMY





ASTRONOMY

ASTRONOMY

9,000 BCE

circa 9,000 BCE to 8,000 BCE: The Maya were making astronomical inscriptions and constructions in Central America.

A marked bone from this time (or as late as 6,500 BC) has been found in Zaire that probably was used as a record of months and lunar phases.

Goats and sheep were domesticated in Iran and [Afghanistan](#). They were yummy. Emmer wheat and barley were cultivated in Canaan. They were yummy. Yummy yummy in the human tummy.

ASTRONOMY



3,200 BCE

[Astronomy](#) began in Sumeria and Akkadia with a period of simple description. Through the later portion of this period, most such names were Sumerian, so some at least must have been of Sumerian origin.

- People watched the sky, and identified and assigned names to the [sun](#), the [moon](#), some of the planets, and some of the stars and constellations of stars.
- The “two ways” scheme for the division of the sky was devised.
- Informal astronomical knowledge was intertwined with mythical themes.



ASTRONOMY

ASTRONOMY

3,000 BCE

circa 3,000 BCE to 2,900 BCE: Cuneiform writing was developed by the Sumerians as an outgrowth of their method of recording numbers. Impressions of clay tokens used for showing measures of grain were becoming standardized as the first numerals: a small measure of grain was in the process of becoming the number 1, while a larger measure was becoming the number 10 (in approximately the same period, symbols would also be introduced for the multiple quantities 60 and 360).

The Babylonians were able to predict some [eclipses](#).

Tooth filling was occurring in Sumer.

Donkeys and mules were being domesticated in what is now Israel.



ASTRONOMY

ASTRONOMY

At about this point, in Uruk, mud tablets were being inscribed with references to a “Festival of the Morning Goddess, Ianna” and a “Festival of the Evening Goddess, Ianna” — presumably these would have been references to the planet [Venus](#) in its roles as morning star and evening star.

[A WEEK](#): The anecdotes of modern astronomy affect me in the same way as do those faint revelations of the Real which are vouchsafed to men from time to time, or rather from eternity to eternity. When I remember the history of that faint light in our firmament, which we call Venus, which ancient men regarded, and which most modern men still regard, as a bright spark attached to a hollow sphere revolving about our earth, but which we have discovered to be **another world**, in itself, — how Copernicus, reasoning long and patiently about the matter, predicted confidently concerning it, before yet the telescope had been invented, that if ever men came to see it more clearly than they did then, they would discover that it had phases like our moon, and that within a century after his death the telescope was invented, and that prediction verified, by Galileo, — I am not without hope that we may, even here and now obtain some accurate information concerning that OTHER WORLD which the instinct of mankind has so long predicted. Indeed, all that we call science, as well as all that we call poetry, is a particle of such information, accurate as far as it goes, though it be but to the confines of the truth. If we can reason so accurately, and with such wonderful confirmation of our reasoning, respecting so-called material objects and events infinitely removed beyond the range of our natural vision, so that the mind hesitates to trust its calculations even when they are confirmed by observation, why may not our speculations penetrate as far into the immaterial starry system, of which the former is but the outward and visible type? Surely, we are provided with senses as well fitted to penetrate the spaces of the real, the substantial, the eternal, as these outward are to penetrate the material universe. Veias, Menu, Zoroaster, Socrates, Christ, Shakespeare, Swedenborg, — these are some of our astronomers.

ASTRONOMY
NICOLAS COPERNICUS
VENUS

At about this period, in Mesopotamian [astronomy](#), the Sumerians were establishing their [lunar calendar](#).



2,807 BCE

May 10, morning: There has recently been speculation that the “Burkle crater” on the floor of the [Indian](#) Ocean at 12,500 feet depth, which is 18 miles in diameter, was produced by an impact on this date. The speculation is that this impact produced a tsunami at least 600 feet high, which carried large amounts of ocean-floor sediments onto the coast of Madagascar, producing four enormous wedge-shaped deposits now referred to as “chevrons.” It is Dr. Bruce Masse of the Los Alamos National Laboratory in New Mexico who has on the basis of cultural records hypothesized that the impact object was a [comet](#) and that its strike date was precisely the morning of May 10th in the year 2,807 BCE. (Dr. Masse does acknowledge that since his evidence for the precise date is merely cultural, and since our oral cultures do not do an excellent job of preserving exactitude, the creation of more lines of inference would be appropriate: “we’re not there yet.”)

Because we’re not there yet, Columbia University is just now proposing to send a graduate student to collect megatsunami deposits from around the Indian Ocean:

Pinpointing the Causes of Holocene Megatsunami Events in Australia

Working under the supervision of Dallas Abbott, Adjunct Research Scientist at the Lamont-Doherty Earth Observatory, the goal of this project is to study sets of Holocene age chevron dunes, in Australia all of which are inferred to be megatsunami deposits. The project seeks to identify the ejecta from the Burkle crater and/or tsunami deposits in bog of lake cores from around the Indian Ocean. This can be accomplished by looking for intervals of abnormally rapid sediment deposition and coarse sediment deposition within the cores. The Burkle impact tsunami should have emplaced chevron dunes in Madagascar and southern Africa. The student will be a partner in an international consortium for tsunami research involving social and earth scientists in Australia, North America and Russia. To accommodate an academic schedule the project will include library work and lab work. The student will use the library to find data on sediment deposition in lakes and coastal areas around the Indian Ocean. The student will also search for, order, and look at maps of Holocene coastal dune deposits in Madagascar and southeastern Africa. The student will spend one day a week at Lamont looking for impact ejecta in deposits from continental and deep sea cores.

SKY EVENT



2,700 BCE

circa 2,700 BCE: At about this period, people were attributing to the goddess Nisiba, goddess of grain and scribal arts, a knowledge of [astronomy](#) that could usefully compensate for the vagaries of the [lunar calendar](#). She was being said to measure heaven and earth, to know the secrets of calculation, and, together with Suen, to “count the days.” Her temple in Eres was being referred to as the “House of the Stars.” She was depicted with a lapis-lazuli tablet which was sometimes being referred to as the “tablet with the stars of the heavens” or as the “tablet with the stars of the pure heavens.” She kept this record in her “House of Wisdom.” Maybe this lapis-lazuli tablet connected in some manner with astronomy amounted to a kind of star-map, or symbolic representation of the heavens. Or, maybe not.

2,600 BCE

To estimate time of day, the [Chinese](#) were using a vertical pole to project the shadow of the Sun.

At about this period, Cylinder A of Gudea was inscribed with a reference to the heliacal rising of a star marking the month (possibly that star was Aldebaran, rising in the constellation Taurus). This cylinder also indicated a system of named stars (possibly a recognition of *Nidaba mul ku-ba* as the constellation of the “corn-goddess”).

At about this period, Cylinder B of Gudea was inscribed with a reference to celestial positioning of [moon](#) by use of lunar “houses.”

At about this period in Elam, a cylindrical stone jar was created that is still in existence, and shows a bestiary and pantheon iconography that we can infer, from later Cassite kudurru, to probably have been related to the stars.

ASTRONOMY

2,500 BCE

circa 2,500 BCE: At about this period, some cuneiform texts were created that are now in the British Museum. The tablets assured early 20th-century British Assyriologists that the ancients had been making reference to the celestial positioning of [moon](#) by use of a series of lunar “houses.”

At about this period, in Mesopotamian [astronomy](#), Sumerians were creating literary compositions that are still in existence. Several of these literary compositions refer to the movements of the heavenly bodies and the constellations. We have a cylinder seal from the Elamite capitol of Susa that bears bestiary and pantheon iconography that we can infer, from later Cassite *kudurru*, to probably have been related to the stars.



ASTRONOMY

ASTRONOMY

2,300 BCE

At about this period a seal of Adda was being fashioned, probably by an Elamite. On this object was incised a bestiary and pantheon iconography that we can infer, from later Cassite kudurru, probably to have been related to the stars.

At about this period, during the *floruit* of Sargon the Great of Agade (this head, although it is of the correct provenance, may or may not be specifically him), omens were being recorded in the canonical series *Enuma Anu Enlil*. This to us implies that the ancients were observing planetary movements and identifying some of the constellations. In all likelihood the omens they were placing on record amounted not to forecasts but to back-dated “as if” predictions of events that had already come to pass.

At about this period, in Mesopotamian [astronomy](#), people began to fashion cylinder seals that made implicit reference to the stars.

2,296 BCE

The earliest presently known record of a [comet](#) sighting — it goes without saying, by the [Chinese](#).

ASTRONOMY

On the other side of the globe what goes around came around: Akkadians conquered Sumerians.



2,250 BCE

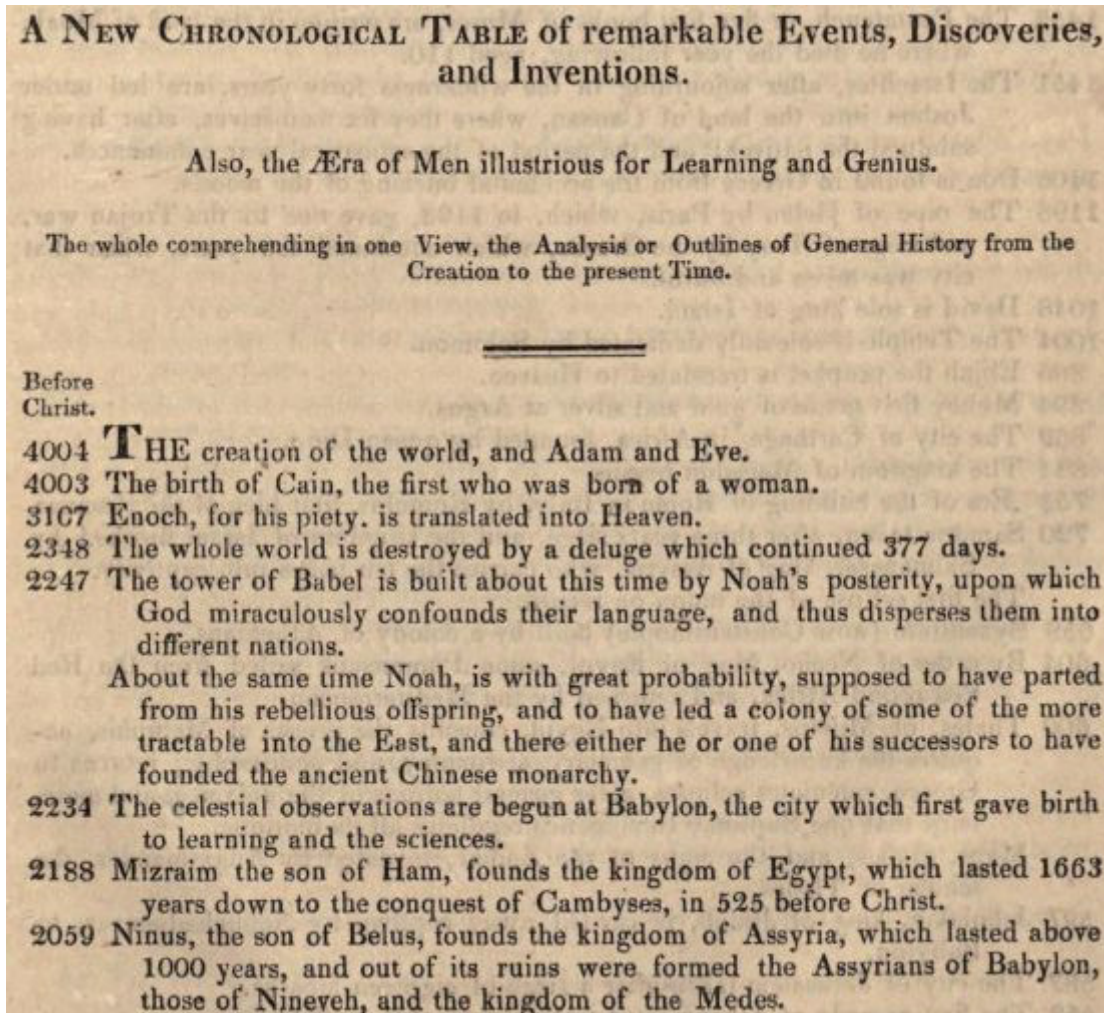
In ancient Sumeria the [poppy](#) *Papaver somniferum* was referred to as “hul gil” or “plant of joy.”




At about this point, Sumerians were beginning systematically to name the more prominent stars and

constellations and to link a scheme of constellations to the twelve [calendar](#) months.

ASTRONOMY



2,217 BCE

A [comet](#) visited. It was not one of these short-period comets which come at us along the plane of rotation of the planets. It was not a mere longer-period P/Halley. This was a special one, a long-period comet out of the Oort cloud beyond the Kuiper belt, “cloud” rather than “belt” because it entirely contains our solar system, it is out there in all directions — and thus this particular comet is probably not ever going to remain within our ecliptic plane. Because the trajectory of Hale-Bopp has been modified significantly during the pass it made during our lifetimes,  by the influence of Jupiter, it is going to make its next plunge toward the sun after waiting in the dark for 2,380 years — that is, in the year 4,377 CE.

<http://http.hq.eso.org/comet-hale-bopp/hale-bopp-eph-feb24-bm.txt>

ASTRONOMY



ASTRONOMY

ASTRONOMY

2,136 BCE

October 22: The [Chinese](#) made their 1st presently known record of an [eclipse](#) of the [sun](#).

ASTRONOMY

2,100 BCE

At about this period, in Mesopotamian [astronomy](#), a popular design for cylinder seals included a [Sun-Moon-Venus](#) triplet.

2,000 BCE

circa 2,000 BCE: At about this period in Sumeria, the composition “Enki and the World Order” was being created. There was a possible reference to celestial positioning of [moon](#) by use of lunar “houses.” Celestial divination was beginning, in that star names and constellation names were being utilized as reference points for the description of celestial omens.

ASTRONOMY

2,000 BCE: Physicians formed an important professional group in Babylon and Syria; their medical practice strongly based on astrology and belief in demons.

2,000 BCE: Mesopotamian cultures learned to solve quadratic equations,¹ that is, equations in which the highest power of the unknown quantity is two.

1. The techniques of mathematics, of the measurement of time, of the production of permanent photographic images, and of the manufacture of glass are equivalently vital in [Astronomy](#), as limiting items in the pace of its discoveries. Therefore, in considering the History of Astronomy, we need always to bear in mind the pace of the development of mathematical skills and capabilities.

MATHEMATICS
CHRONOMETRY
PHOTOGRAPHY
GLASSMAKING



ASTRONOMY

ASTRONOMY

1,900 BCE

Mesopotamian mathematicians discovered what we now consider the “Pythagorean” theorem (Pythagoras at this point wasn’t even a gleam in his daddy’s eye).

Manapuri ancient scripture Puyus written – some depicted polo and [hockey](#) being played by deities.

A British culture known as the Wessex People builds Stonehenge IIIB on Salisbury Plain. The most recent speculation is that the structure was designed to measure the 19-year cycle of lunar eclipses. Although often called a Celtic construction, the Gallic Celts would not arrive in southern England until the sixth century BCE. The story about this being a Druid temple only dates to the 17th Century CE — before then the English had considered this to have been some Roman or Saxon construction.

An unidentified culture places 167 large stones in an ellipse at Mzoura, Morocco, about 30 miles southwest of Tangier. Prehistorians speculate that the construction served astronomical functions, as the stones do align with

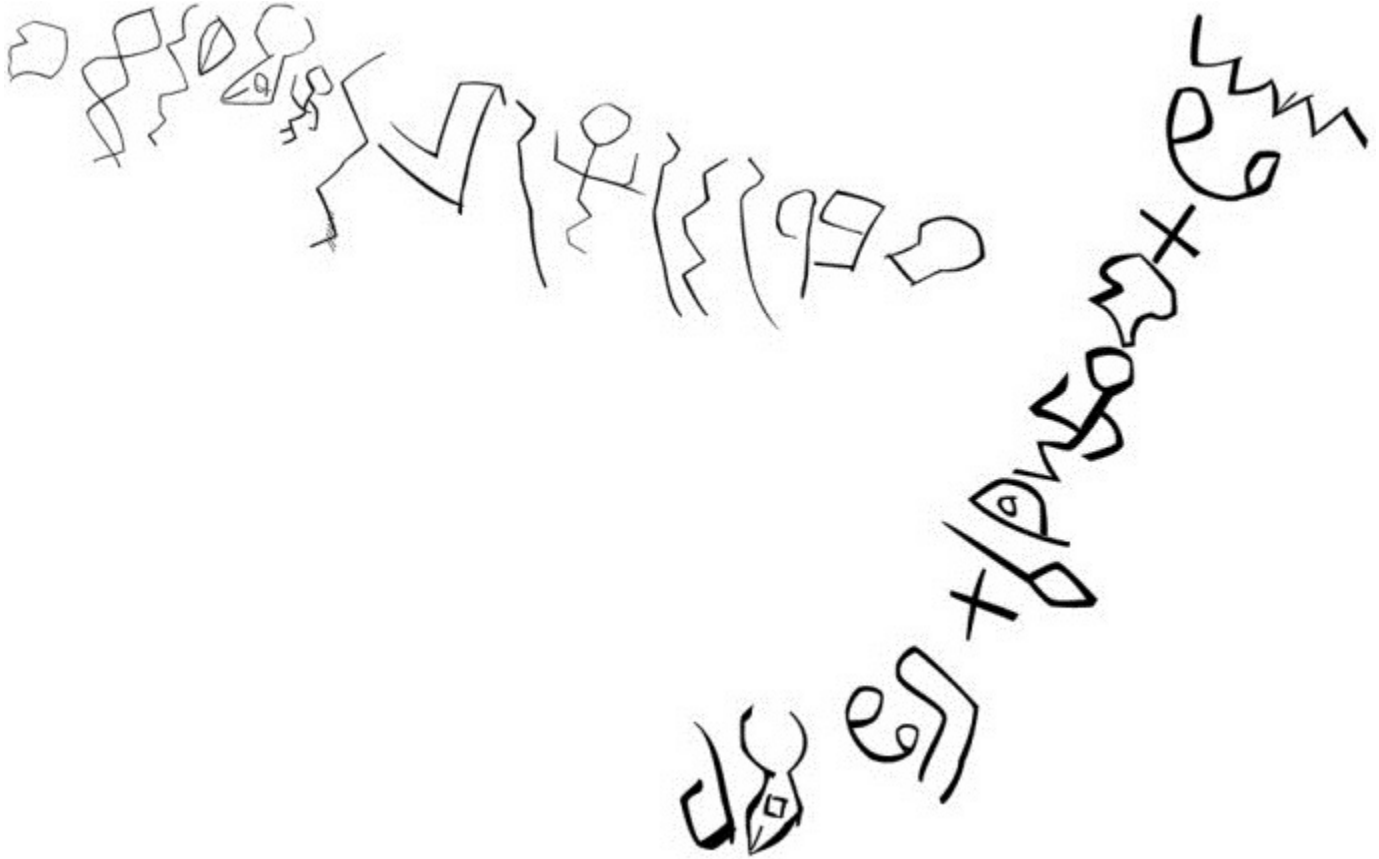
ASTRONOMY

ASTRONOMY

the setting sun in the spring and fall and their placement required considerable knowledge of right angles.

Egyptian sappers used portable huts made out of reed frames covered with animal hides, to protect engineers from arrows and hot oil while they used spades to dislodge bricks from the walls of besieged enemy cities.

The earliest example of an inscription that seems to have been at least “on its way toward” alphabetic writing, at Wadi el-Hol, between Luxor and Abydos in [Egypt](#).



We speculate that this may be the record of a “tailgate party” or worship at which a roast ox was consumed along with considerable inebriation. Only a few of the marks are arguably alphabetic, that is, translatable as spoken syllables of the words of a language.

1,813 BCE

The Old Babylonian Period. For computations of day and night we find two systems. System A dates probably before 1,000 BCE and is connected with the Enuma Anu Enlil omen series and the circular astrolabes. System B dates from about 700 BCE. The two basic methods which characterize the Babylonian approach to astral phenomena are observation and computation. Whilst some texts are primarily either observational or mathematical it was common for both methods to be integrated within the same text. During this period Babylonians were concerned with the appearance and disappearance of [Venus](#), the duration of day and night, with the rising and setting of the [moon](#), and with planetary and stellar risings and settings.

ASTRONOMY

1921 The covenant of God made with Abram, when he leaves Haran to go into Canaan, which begins the 430 years of sojourning.

1897 The cities of Sodom and Gomorrah are destroyed for their wickedness by fire from Heaven.

1856 The kingdom of Argos, in Greece, begins under Inachus.

1822 Memnon, the Egyptian, invents the letters.

1715 Prometheus first struck fire from flints.

1635 Joseph dies in Egypt, which concludes the book of Genesis, containing a period of 2369 years.

1574 Aaron born in Egypt: 1490, appointed by God first high priest of the Israelites.

1571 Moses, brother to Aaron, born in Egypt, and adopted by Pharoah's daughter, who educates him in all the learning of the Egyptians.

1556 Cecrops brings a colony of Saïtes from Egypt into Attica, and begins the kingdom of Athens in Greece.

1546 Scamander comes from Crete into Phrygia, and begins the kingdom of Troy.

1493 Cadmus carried the Phœnician letters into Greece, and built the citadel at Thebes.

1491 Moses performs a number of miracles in Egypt, and departs from that kingdom, together with 600,000 Israelites, besides children: which completed the 430 years of sojourning. They miraculously pass through the Red Sea, and come to the desert of Sinai, where Moses receives from God, and delivers to the people, the Ten Commandments, and the other laws, and sets up the tabernacle, and in it the ark of the covenant.

1485 The first ship that appeared in Greece, was brought from Egypt by Danaus, who arrived at Rhodes, and brought with him his fifty daughters.

1453 The first Olympic games celebrated at Olympia, in Greece.

1452 The Pentateuch, or five first books of Moses, are written in the land of Moab, where he died the year following, aged 110.

1451 The Israelites, after sojourning in the wilderness forty years, are led under Joshua into the land of Canaan, where they fix themselves, after having subdued the natives: and the period of the sabbatical year commences.

1406 Iron is found in Greece from the accidental burning of the woods.

1198 The rape of Helen by Paris, which, in 1193, gave rise to the Trojan war, and siege of Troy by the Greeks, which continued ten years, when that city was taken and burnt.



1,800 BCE

A news item relating to the development of ELECTRIC WALDEN technology:

- Ceramic pottery and heddle weaving spread through the Andean highlands (the cloth and pots were decorated with designs similar to ones still in use four thousand years later).
- Metallurgy spread through northern Europe.
- A Babylonian mathematician developed algorithms to resolve numerical problems.
- At about this period in Mesopotamian [astronomy](#) (the Early Old Babylonian Period), Hammurabi imposed a single official [lunar calendar](#) upon the Babylonian Empire, and the 1st identifiable star-list appeared in “Prayer to the Gods of the Night.”
- Over the half century between 1,800BCE and 1,750BCE multiplication tables appeared in Mesopotamia.
- Sumerian astronomers, many of whom were female, were using calculations in which hours were made up of 60 minutes, and circles of 360 degrees (they were also attempting to predict and control the weather, and not only their 60-minute hours and 360-degree circles, but also these meteorological struggles, would be carried over into Hellenistic astrology).²

2. The people we term “ancient Greeks” spoke various languages many of which were not like Greek at all. Macedonian, for instance, is a Slavonic language. Over and above that, most of these “Hellenes” did not reside in what we now consider Greece — Troy, for one example, was on the Dardanelles coast of Turkey. Nevertheless these people did share a common culture. Accordingly, historians use the term “Hellenic” to indicate the very insular pre-Alexandrian Greek culture and the term “Hellenistic” to indicate the more cosmopolitan post-Alexandrian Greek culture. For convenience they date the change to 337 BCE, when Alexander of Macedon’s father Philip II united the previously antagonistic Hellenic city-states behind an invasion of Iran. Also, while it’s commonly said that Sumerian astrology influenced Vedic, or Indian, astrology, this is probably ethnocentrism rather than documented fact. Even if it did, the Indian methods clearly diverged. To provide just one illustration, the Vedic astrologers, rather than dividing the day into 24 parts each having 60 parts, divided the day into 60 parts (*nalika*) each having 24 parts.



ASTRONOMY

ASTRONOMY

1,750 BCE

The Moscow Papyrus, dating from the 12th Dynasty of [Egypt](#) (the Moscow and Rhind papyruses are our two main sources of knowledge of Egyptian mathematics), indicating that there was already considerable knowledge of geometry, for instance a formula for the volume of a truncated pyramid.

At about this period, in Mesopotamian [astronomy](#), a mud tablet was inscribed with info about the appearance and disappearance of [Venus](#) (and omens).

[A WEEK](#): The anecdotes of modern astronomy affect me in the same way as do those faint revelations of the Real which are vouchsafed to men from time to time, or rather from eternity to eternity. When I remember the history of that faint light in our firmament, which we call Venus, which ancient men regarded, and which most modern men still regard, as a bright spark attached to a hollow sphere revolving about our earth, but which we have discovered to be **another world**, in itself, – how Copernicus, reasoning long and patiently about the matter, predicted confidently concerning it, before yet the telescope had been invented, that if ever men came to see it more clearly than they did then, they would discover that it had phases like our moon, and that within a century after his death the telescope was invented, and that prediction verified, by Galileo, – I am not without hope that we may, even here and now obtain some accurate information concerning that OTHER WORLD which the instinct of mankind has so long predicted. Indeed, all that we call science, as well as all that we call poetry, is a particle of such information, accurate as far as it goes, though it be but to the confines of the truth. If we can reason so accurately, and with such wonderful confirmation of our reasoning, respecting so-called material objects and events infinitely removed beyond the range of our natural vision, so that the mind hesitates to trust its calculations even when they are confirmed by observation, why may not our speculations penetrate as far into the immaterial starry system, of which the former is but the outward and visible type? Surely, we are provided with senses as well fitted to penetrate the spaces of the real, the substantial, the eternal, as these outward are to penetrate the material universe. Veias, Menu, Zoroaster, Socrates, Christ, Shakespeare, Swedenborg, – these are some of our astronomers.

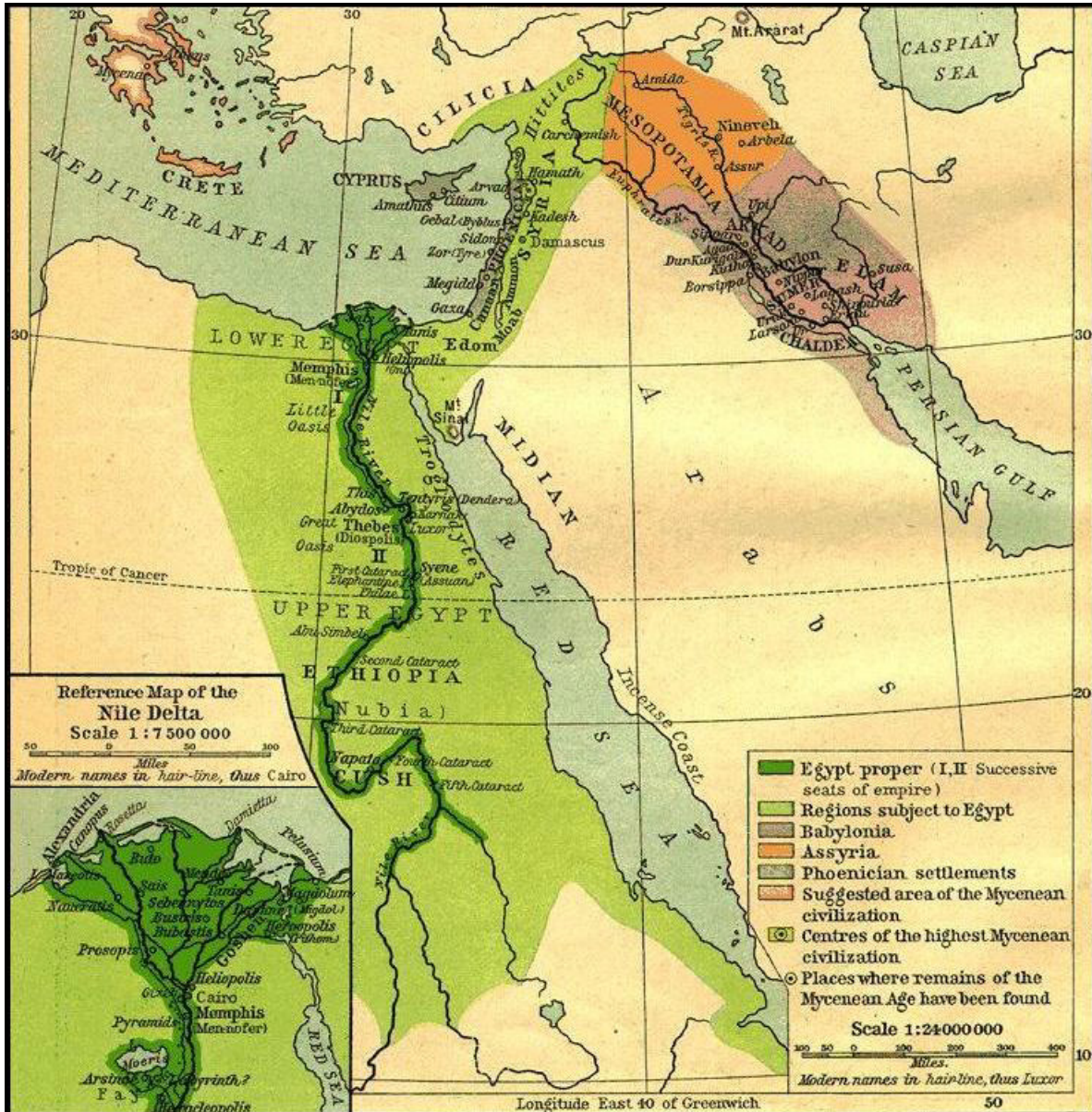
ASTRONOMY
NICOLAS COPERNICUS

ASTRONOMY

ASTRONOMY

1,600 BCE

circa 1,600 BCE: At about this point in our trajectory, the dynasty of Babylon was being overthrown by Hittites from Anatolia (Turkey) and Syria.



In Mesopotamia, where the Kassites were at the moment in charge, the signs of the Zodiac were being established by Chaldean astrologers.

Something exceedingly bright appeared in our skies at about this point, for a very close star, only about 1,400 light years away, had gone into supernova. We still have its Veil nebula across our skies. In evaluating electronic photos of this Cygnus Loop, which extends for about three degrees across the northern sky, taken by the Hubble Space Telescope, and comparing these with earlier records of this wisp on a photographic plate



ASTRONOMY

ASTRONOMY

exposed at the Palomar Mountain observatory in southern California in 1953, astronomers have been able to calculate that the wisp originated in a star some 15 times the mass of our Sol. Such a supernova at such a distance must have been at least as noticeable to our ancestors as the full moon.

ASTRONOMY

1,500 BCE

circa 1,500 BCE: At about this period, in Mesopotamian [astronomy](#), the “three ways” were being established on the eastern horizon.

News items relating to the development of ELECTRIC WALDEN technology:

- Near the Black Sea, Hittites were referring to iron as “metal from heaven,” that is, from meteorites.
- During the Shang Dynasty in [China](#), divination inscriptions were being made on the bottom carapaces of turtles and on the shoulder blades of domestic animals. One such fragment indicates that the Chinese already knew the length of the solar year to be $365\frac{1}{4}$ days.



“History is the why of now.”

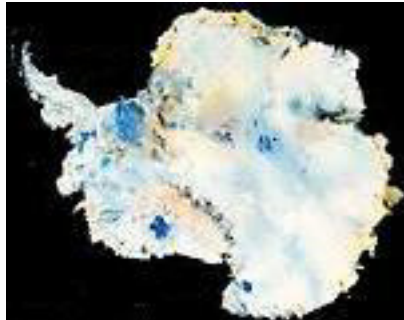
— Austin Meredith

Austin Meredith



1,404 BCE

October 15: [Halley's Comet](#) whipped around the sun. Had someone been aboard this [comet](#), since it was making a close south polar passage they might have been able to make out through the patterns of white clouds rotating in arcs over a blue background, a whirling spot of white at the center of the only partly illuminated conceptual circle: that was the snow-covered continent of Antarctica. Such an observer would not have been able to view,



beyond the horizon of the circle, the [Egypt](#) of the Middle Kingdom under the reign of Pharaoh Amenhotep III, which was near its zenith after the reigns of [Queen Hatshepsut](#) and Pharaoh Thutmose III. The revolutionary or reactionary pharaoh who called himself Ikhnaton had not yet been born, and before this apparition's next return he would be deceased and his name would have been scoured from his steles. The boy [Pharaoh Tutenkhamon](#) also would by that next return be already sealed in his gilded chamber beneath the sands, waiting to be discovered by us during this modern era.

ASTRONOMY



HALLEY'S COMET



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EDMOND HALLEY

ASTRONOMY

ASTRONOMY

1921 The covenant of God made with Abram, when he leaves Haran to go into Canaan, which begins the 430 years of sojourning.
 1897 The cities of Sodom and Gomorrah are destroyed for their wickedness by fire from Heaven.
 1856 The kingdom of Argos, in Greece, begins under Inachus.
 1822 Memnon, the Egyptian, invents the letters.
 1715 Prometheus first struck fire from flints.
 1635 Joseph dies in Egypt, which concludes the book of Genesis, containing a period of 2369 years.
 1574 Aaron born in Egypt: 1490, appointed by God first high priest of the Israelites.
 1571 Moses, brother to Aaron, born in Egypt, and adopted by Pharaoh's daughter, who educates him in all the learning of the Egyptians.
 1556 Cecrops brings a colony of Saïtes from Egypt into Attica, and begins the kingdom of Athens in Greece.
 1546 Scamander comes from Crete into Phrygia, and begins the kingdom of Troy.
 1493 Cadmus carried the Phœnician letters into Greece, and built the citadel at Thebes.
 1491 Moses performs a number of miracles in Egypt, and departs from that kingdom, together with 600,000 Israelites, besides children: which completed the 430 years of sojourning. They miraculously pass through the Red Sea, and come to the desert of Sinai, where Moses receives from God, and delivers to the people, the Ten Commandments, and the other laws, and sets up the tabernacle, and in it the ark of the covenant.
 1485 The first ship that appeared in Greece, was brought from Egypt by Danaus, who arrived at Rhodes, and brought with him his fifty daughters.
 1453 The first Olympic games celebrated at Olympia, in Greece.
 1452 The Pentateuch, or five first books of Moses, are written in the land of Moab, where he died the year following, aged 110.
 1451 The Israelites, after sojourning in the wilderness forty years, are led under Joshua into the land of Canaan, where they fix themselves, after having subdued the natives: and the period of the sabbatical year commences.
 1406 Iron is found in Greece from the accidental burning of the woods.
 1198 The rape of Helen by Paris, which, in 1193, gave rise to the Trojan war, and siege of Troy by the Greeks, which continued ten years, when that city was taken and burnt.

1,400 BCE

At about this point, in Mesopotamian [astronomy](#), observations were being made of the heliacal risings of fixed stars.

Babylonians developed a scheme of 34 heliacally rising stars (and their constellations) associated with the twelve [calendar](#) months (used by later stars list such as “The Stars of Elam, Akkad and Amurru,” and Mul Apin series).

List of 34 heliacally rising stars (this would become the basis for Stars of Elam, for Akkad and Amurru, for “Astrolabes,” and for Mul Apin).³



ASTRONOMY

ASTRONOMY

The following developments would characterize this portion of the Cassite period of Mesopotamian [astronomy](#):

- Composition of the great Omen Series “Enuma Anu Enlil.”
- Exact observations of the heliacal risings of fixed stars.
- Observations of daily risings, culminations, and settings.
- Before 1,000 BCE, composition of circular and rectangular Astrolabes.
- A very primitive representation of the [Venus](#) phenomena by arithmetical sequences would be inscribed upon tablet 63 of the great Omen Series.
- Calculations of the lengths of day and night by increasing and decreasing arithmetical series would be inscribed upon tablet 14 of the great Omen Series.

1,350 BCE

At about this period, in Mesopotamian [astronomy](#), the stars of Elam, Akkad and Amurru. (Establishment of system of paranatellonta — simultaneously rising stars on the eastern horizon.)

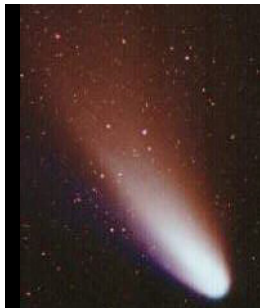
At this point, in the skies of the northern hemisphere of the planet Earth, the pole star was not Polaris, as it is now, but Thuban, the brightest star in the constellation Draco.

1,334 BCE

August 25: [Halley's Comet](#) whipped around the sun.

ASTRONOMY

3. In Babylonian [astronomy](#) the “fundamental stars” were those stars by whose horizon position time and the calendar were reckoned.



HALLEY'S COMET



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EDMOND HALLEY

1,300 BCE

At about this period, in Mesopotamian [astronomy](#), the system of normal stars was coming to be used to mark the positions of the [moon](#) and planets across the sky.

The Arabs domesticated dromedary camels. As dromedaries can't bite or kick especially well and have no real defenses except relatively slow flight, this is what presumably saved the animals from extinction.

Patrilineal religions spread through the Middle East. The many stories about male gods castrating their fathers and raping their mothers may be reminders of conflicts between newer and older styles of religion.

The Rigveda ("Knowledge Hymn") provides the earliest reference to hereditary castes in India. According to

its texts, the mouth of the god Purusha became brahman (“those who pray,” or priests). Purusha’s two arms became rajayana, or kings, a category that was later changed to kshatriya, or nobles. (There was frequently conflict between the kings, priests, and nobles concerning which of them was in charge.) Meanwhile, Purusha’s two thighs became wealthy merchants and landowners (vaishya). Finally, the god’s two feet became farmers and artisans (shudra). From a modern perspective, the reason that commerce was undervalued involved the discomfort that churchmen and kings, who had inherited their land and the peasants who worked on it, felt around anyone who was capable of earning the money needed to purchase land. Similarly, artisans were undervalued because they had to work for a living, something from which aristocrats and churchmen were exempt (villages of peasants were presumably of no interest to anyone except themselves, so long as they paid their taxes, and had about the same standing as herds of cattle).

1,266 BCE

September 5: [Halley’s Comet](#) whipped around the sun in about the middle of the 67-year reign of [Pharaoh Rameses II](#) (1,300-1,223 BCE).

ASTRONOMY

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HALLEY’S COMET



EDMOND HALLEY





ASTRONOMY

ASTRONOMY

1,250 BCE

1,250 BCE: The Babylonians developed an instrument that could determine when a star or planet was due South.

ASTRONOMY

circa 1,250 BCE: At about this period, in Mesopotamian [astronomy](#), the series “Enuma Anu Enlil” (this refers to the stars Elam, Akkad, and Amurru).

1,200 BCE

At about this period, in Mesopotamian [astronomy](#), tabular list of the 12 stars of Elam, 12 stars of Akkad, and 12 stars of Amurru. Also, the beginning of exact observations of heliacally rising stars.

1,198 BCE

May 11: [Halley's Comet](#) whipped around the sun while, perhaps, Moses and the crowd of Hebrews he was leading were still seeking a venue in which to effect their permanent resettlement, and while, perhaps, the richness of the settlement at Troy was attracting covetous glances. (You will understand that such a dating of the Exodus, and of the Trojan War, is at best conjectural.)

ASTRONOMY



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EDMOND HALLEY

ASTRONOMY

ASTRONOMY

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1048 David is sole king of Israel.

1004 The Temple is solemnly dedicated by Solomon.

896 Elijah the prophet is translated to Heaven.

894 Money first made of gold and silver at Argos.

869 The city of Carthage, in Africa, founded by queen Dido.

824 The kingdom of Macedon begins.

753 Æra of the building of Rome in Italy, by Romulus, first king of the Romans.

720 Samaria taken, after three years siege, and the kingdom of Israel finished by Salmanasar, king of Assyria, who carries the ten tribes into captivity.

The first eclipse of the moon on record.

658 Byzantium (now Constantinople) built by a colony of Athenians.

604 By order of Necho, king of Egypt, some Phœnicians sailed from the Red Sea round Africa, and returned by the Mediterranean.

600 Thales, of Miletus, travels into Egypt, consults the priests of Memphis, acquires the knowledge of geometry, astronomy, and philosophy; returns to Greece, calculates eclipses, gives general notions of the universe, and maintains that one Supreme Intelligence regulates all its motions.

Maps, globes, and the signs of the Zodiac, invented by Anaximander, the scholar of Thales.

597 Jehoiakin, king of Judah, is carried away captive, by Nebuchadnezzar, to Babylon.

587 The city of Jerusalem taken after a siege of eighteen months.

562 The first comedy at Athens acted upon a moveable scaffold.

1,150 BCE

circa 1,150 BCE: At about this period, in Mesopotamia, circular “astrolabes” (circular planispheres) began to be fabricated. Astrolabes were of the “3 stars each” variety (12 stars of Ea, 12 stars of Anu, and 12 stars of Enlil). This marked the beginnings of a form of simple mathematical [astronomy](#). Planetary movements were of primary interest. Accurate observations began to be made of the risings and settings of the planets, the [sun](#), and the [moon](#).

1,129 BCE

April 3: [Halley's Comet](#) whipped around the sun.

ASTRONOMY



HALLEY'S COMET



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EDMOND HALLEY

1,100 BCE

circa 1,100 BCE: At about this period, in Mesopotamian [astronomy](#), rectangular “astrolabes” began to be fabricated.

1,062 BCE

July 31, 1,062 BCE: There was a solar [eclipse](#) over Babylon.

SKY EVENT

1,059 BCE

According to Ho Peng Yoke's "Ancient and medieval observations of comets and novae in Chinese sources," Vistas in Astronomy 5(1964):127-225, while King Wu-Wang was pressing a punitive war against King Chou, there appeared a *hui-xing* broom star (comet) in the skies over China with its handle pointing toward the east.⁴

ASTRONOMY

1,057 BCE

December 3: Halley's Comet whipped around the sun while, in China, the Shang dynasty was veering toward its collapse.

ASTRONOMY

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HALLEY'S COMET



EDMOND HALLEY

4. According to Xi Ze-zong's "The cometary atlas in the silk book of the Han tomb at Mawangdui," Chinese Astronomy and Astrophysics 8(1984):1-7, a book of silk pages found in a Han tomb dating to circa 168 BCE, first opened in 1973, indicates that this is what a *hui-xing* broom comet looked like. The army that gained the direction in which such a comet pointed would win. (According to Joseph Needham, Arthur Beer, and Ho Ping Yü's "Spiked comets in Ancient China," Observatory 77(1957):137-8, there is a text by Li Chung-feng dating to about 635 CE during the Chin dynasty, saying that "Brooms govern the sweeping away of old things and the assimilation of the new.")

1,002 BCE

It is possible that in this year the [Chinese](#) observed a [comet](#) in the constellation Leo, with a perihelion passage time of 251 units.

ASTRONOMY

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597 Jehoiakin, king of Judah, is carried away captive, by Nebuchadnezzar, to Babylon.

587 The city of Jerusalem taken after a siege of eighteen months.

562 The first comedy at Athens acted upon a moveable scaffold.

1,000 BCE

circa 1,000 BCE: At about this point, in the development of [astronomy](#), the Babylonian constellations and star names were fully developed. The [calendar](#) was regulated by the risings of stars and constellations.

1,000-612 BCE: The systematic observation of celestial phenomena began in the Assyrian Period and continued without a break through the Late Assyrian Period into late Seleucid times. There was the [astronomy](#) of the MUL.APIN series. The main astronomical achievements of this period would be:

- There would be detailed study of the fixed stars: of their risings, their culminations, and their settings.

ASTRONOMY

ASTRONOMY

- There would be calculations by “linear methods” of the duration of daylight and the rising and setting of the [moon](#).
- A recognition would arise, of the Zodiac as the path of the [moon](#), the [sun](#), and the planets.
- The Zodiacal constellations would become established.
- The position of the Zodiac with regard to the zones of Enlil, Anu, and Ea would be established.
- The seasons of the year would be recognized.
- The tabular form of the “3 stars each” (12 stars of Ea, 12 stars of Anu, and 12 stars of Enlil).
- [Eclipses](#) of the [moon](#) would be being predicted with reasonable accuracy.

986 BCE

December 2: [Halley's Comet](#) whipped around the sun — but it was probably dimmer from the earth on this pass than at any other. We calculate that King David was reigning over his Jewish kingdom from 1010 to 974 BCE, but it is unlikely that he or anyone else would have been able to pay much attention to this particular apparition since in all likelihood (unless there was one of those flares that comets occasionally do exhibit), this time the [comet](#) would have gotten no brighter than a second-magnitude star as it had neared the Sun, and it would have been even fainter than that as it had made its descending passage past the orbit of the Earth just prior to this date. The likelihood, therefore, that Halley's Comet can be identified as the historically mentioned “Star of David” is therefore quite as improbable as that this “Star of David” apparition had actually been the bank of lights at some night football game or the Goodyear blimp circling above that game.

SKY EVENT

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HALLEY'S COMET



EDMOND HALLEY



ASTRONOMY

ASTRONOMY

974 BCE

Spring: According to Ho Peng Yoke's "Ancient and medieval observations of comets and novae in Chinese sources," Vistas in Astronomy 5(1964):127-225, an *po* or "bushy star" [comet](#) appeared in the north polar region and was observed by astrologers in [China](#). According to a private communication by David W. Pankenier to Donald K. Yeomans in January 1983, the date of this ought to be 963 BCE rather than 974 BCE, and also, since there seems to have been a systematic 4-year error in the reporting of events during this period, the date of this comet ought actually to have been 959 BCE rather than 963 BCE.

SKY EVENT

911 BCE

May 20: [Halley's Comet](#) whipped around the sun, but at least so far there has been no reference found, that anyone happened to see it. (Possibly, however, the first time the great Orionid storm of meteors appeared, was during Homer's lifetime.)

SKY EVENT



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EDMOND HALLEY

876 BCE

A symbol for zero was used in an inscription in [India](#), this being the 1st known reference to such a symbol (though the concept itself, who knows, may well have originated rather earlier).

836 BCE

May 9: [Halley's Comet](#) whipped around the sun, but at least so far there has been no reference found, that anyone happened to see it.

SKY EVENT



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EDMOND HALLEY

ASTRONOMY

ASTRONOMY

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562 The first comedy at Athens acted upon a moveable scaffold.

800 BCE

At about this period, a nomenclature for the most prominent stellar objects was adopted by the ancient Greeks.

Babylonian establishment of rules for lunar and planetary phenomena (written down in Seleucid times in tablet TU II).

ANCIENT CALCULATION

Use of water clocks in Babylonian [astronomy](#).



ASTRONOMY

ASTRONOMY

775 BCE

September 6: In [China](#), an eclipse of the [sun](#).

ASTRONOMY

This is the first astronomically verifiable date in Chinese history. Another solar eclipse on March 10, 721 BCE serves the same function in Babylonian history.

763 BCE

June 15, 763 BCE: Over Nineveh in Ashur, Assyria, an eclipse of the [sun](#).

This is the 1st one they recorded. It's the one that gave rise to the mention in AMOS 8:9.

ASTRONOMY

ASV: And it shall come to pass in that day, saith the Lord Jehovah, that I will cause the sun to go down at noon, and I will darken the earth in the clear day.

BBE: And it will come about in that day, says the Lord God, that I will make the sun go down in the middle of the day, and I will make the earth dark in daylight:

DBY: And it shall come to pass in that day, saith the Lord Jehovah, that I will cause the sun to go down at noon, and I will darken the land in the clear day.

KJV: And it shall come to pass in that day, saith the Lord GOD, that I will cause the sun to go down at noon, and I will darken the earth in the clear day:

JPS: And it shall come to pass in that day, saith the Lord GOD, that I will cause the sun to go down at noon, and I will darken the earth in the clear day.

WBS: And it shall come to pass in that day, saith the Lord GOD, that I will cause the sun to go down at noon, and I will darken the earth in the clear day:

WEB: It will happen in that day," says the Lord Yahweh, "that I will cause the sun to go down at noon, and I will darken the earth in the clear day.

YLT: And it hath come to pass in that day, An affirmation of the Lord Jehovah, I have caused the sun to go in at noon, And caused darkness on the land in a day of light,

PROPHETIA AMOS

583

CAPUT VII.

Deprecatur propheta poenas quas videt imminere; et Dominus comminatur captivitatem, quam Amos sub parabola trullae caementarii vaticinatur, adversante licet Amasia sacerdote Bethel: qui coram rege Israel accusat Amos, suadens ipsi Amos ut eat prophetatum in terram Iuda: sed ostendit se factum a Domino prophetam ut super Israel prophetaret, qui et Amasiae et Israeli vaticinatur afflictiones.

1. Haec ostendit mihi Dominus Deus: et ecce flector locustae in principio germinantium serotini imbris, et ecce serotinus post tonsionem regis.

2. Et factum est: cum consummasset comedere herbam terrae, dixi: Domine Deus propitius esto, obsecro: quis suscitabit Iacob, quia parvulus est?

3. Misertus est Dominus super hoc: Non erit, dixit Dominus.

4. Haec ostendit mihi Dominus Deus: et ecce vocabat iudicium ad ignem Dominus Deus: et devoravit abyssum multam, et comedit simul partem.

5. Et dixi: Domine Deus quiesce, obsecro: quis suscitabit Iacob, quia parvulus est?

6. Misertus est Dominus super hoc: Sed et istud non erit, dixit Dominus Deus.

7. Haec ostendit mihi Dñs: et ecce Dñs stans super murum litum, et in manu eius trulla caementarii.

8. Et dixit Dominus ad me: Quid tu vides Amos? Et dixi: Trullam caementarii. Et dixit Dominus: Ecce ego ponam trullam in medio populi mei Israel: non adiciam ultra superinducere eum.

9. Et demolientur excelsa idoli, et sanctificationes Israel desolabuntur: et consurgam super domum Ieroboam in gladio.

10. Et misit Amasias sacerdos Bethel ad Ieroboam regem Israel, dicens: Rebellavit contra te Amos in medio domus Israel: non poterit terra sustinere universos sermones eius.

11. Haec enim dicit Amos: In gladio morietur Ieroboam, et Israel captivus migrabit de terra sua.

12. Et dixit Amasias ad Amos: Qui vides, gradere, fuge in terram Iuda: et comede ibi panem, et prophetabis ibi.

13. Et in Bethel non adicies ultra ut prophetes: quia sanctificatio regis est, et domus regni est.

14. Responditque Amos, et dixit ad Amasiam: Non sum propheta, et non sum filius prophetae: sed armentarius ego sum vellicans sycomoros.

15. Et tulit me Dominus cum sequeretur gregem: et dixit Dominus ad me: Vade propheta ad populum meum Israel.

16. Et nunc audi verbum Domini: Tu dicis: Non prophetabis super Israel, et non stillabis super domum idoli.

17. Propter hoc haec dicit Dominus: Uxor tua in civitate fornicabitur: et filii tui, et filiae tuae in gladio cadent, et humus tua funiculo metietur: et tu in terra polluta morieris, et Israel captivus migrabit de terra sua.

CAPUT VIII.

Amos sub parabola uncini pomorum prophetat finem imminere regni Israel: propter pauperum oppressiones: acerbiter vero imminentis calamitatis explicat: ac festivitates eorum dicit in luctum convertendas, famemque verbi Dei futuram denuntiat.

1. Haec ostendit mihi Dominus Deus: et ecce un-

2. Et dixit: Quid tu vides Amos? Et dixi: Uncinum pomorum. Et dixit Dominus ad me: Venit finis super populum meum Israel: non adiciam ultra ut pertranseam eum.

3. Et stridebunt cardines templi in die illa, dicit Dominus Deus: multi morientur: in omni loco proicietur silentium.

4. Audite hoc qui conteritis pauperem, et deficere facitis egenos terrae,

5. Dicentes: Quando transibit mensis, et venundabimus merces: et sabbatum, et aperiemus frumentum: ut imminuamus mensuram, et augeamus siclum, et supponamus stateras dolosas,

6. Ut possideamus in argento egenos et pauperes pro calceamentis, et quisquilias frumenti vendamus?

7. Iuravit Dominus in superbiam Iacob: Si oblitus fuero usque ad finem omnia opera eorum.

8. Numquid super isto non commovebitur terra, et lugebit omnis habitator eius: et ascendet quasi fluvius universus, et elicietur, et defluet quasi rivus Aegypti?

9. Et erit in die illa, dicit Dominus Deus: occidet sol in meridie, et tenebrescere faciam terram in die luminis:

10. (a) Et convertam festivitates vestras in luctum, et omnia cantica vestra in planctum: et iudicam super omne dorsum vestrum saccum, et super omne caput calvitium: et ponam eam quasi luctum unigeniti, et novissima eius quasi diem amarum.

11. Ecce dies veniunt, dicit Dominus: et mittam famem in terram: non famem panis, neque sitim aquae, sed audiendi verbum Domini.

12. Et commovebuntur a Mari usque ad mare, et ab Aquilone usque ad Orientem: circuibunt quaerentes verbum Domini, et non invenient.

13. In die illa deficient virgines pulchrae, et adolescentes in siti.

14. Qui iurant in delicto Samariae, et dicunt: Vivit Deus tuus Dan: et vivit via Bersabee, et cadent, et non resurgent ultra.

CAPUT IX.

Vastaturum se dicit Dominus impios, sic ut nulli pateat effugium; postea tamen suscitabit tabernaculum David, et captivitatem filiorum Israel convertet, cum magna ipsorum felicitate.

1. Vidi Dominum stantem super altare, et dixit: Percute cardivem, et commoveantur superliminaria: avaritia enim in capite omnium, et novissimum eorum in gladio interficiam: non erit fuga eis. Fugient, et non salvabitur ex eis qui fugerit.

2. (b) Si descenderint usque ad infernum, inde manus mea educet eos: et si ascenderint usque in caelum, inde detraham eos.

3. Et si absconditi fuerint in vertice Carmeli, inde scrutans auferam eos: et si celaverint se ab oculis meis in profundo maris, ibi mandabo serpenti, et mordebit eos.

4. Et si abierint in captivitatem coram inimicis suis, ibi mandabo gladio, et occidet eos: et (c) ponam oculos meos super eos in malum, et non in bonum.

5. Et Dominus Deus exercituum, qui tangit terram, et tabescet: et lugebunt omnes habitantes in ea: et ascendet sicut rivus omnis, et defluet sicut fluvius Aegypti.

(a) Tob. 2, 6.
1 Mac. 1, 41.

(b) Psal.
138, 8.

(c) Jer. 44, 11.

ASTRONOMY

ASTRONOMY

August 5: [Halley's Comet](#) whipped around the sun, and on its way out from the sun it would be passing through the plane of Earth's orbit about 5 1/2 lunar distances from that orbit. (Passing close by the orbital path of Earth is **not** the same thing as passing close by the planet itself, as we were at that moment quite somewhere else along our trajectory around Sol.)

SKY EVENT



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, → 1,057 BCE, → 466 BCE, → 391 BCE, → and 315 BCE, → but then on the 240 BCE → return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE → and again in 87 BCE, → and then it was recorded as being seen in 12 BCE, → 66 CE, → 141 CE, → 218 CE, → 295 CE, → 374 CE, → 451 CE, → 530 CE, → 607 CE, → 684 CE, → 760 CE (only by Chinese), → 837 CE, → 912 CE, → 989 CE, → 1066, → 1145, → 1222, → 1301, → 1378, → 1456, → 1531, → 1607, → 1682, → 1758, → 1835, → 1910, → and 1986 → – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY

753 BCE

753 BCE: Water clocks were in use in Assyria.



750 BCE

circa 750 BCE: At about this period, in Mesopotamian [astronomy](#), dated observations of [eclipses](#) in Babylon.

Recognition of the ecliptic and establishment of zodiacal constellations.

Use of 18 “counting stars” along the path of the [moon](#) to measure the progress of this object through the month.

Development of “Astronomical Diaries” as a record of personal daily observations.

In the middle of the 8th century BCE [astronomy](#) seems to have received a new impetus, as shown by:

- Systematic observation of [eclipses](#) from the time of Nabonassar (747-735) on (start of frequent record keeping regarding lunar and solar eclipses, occultations, etc. till 50 BCE).
- Successful predictions of lunar [eclipses](#) in the 7th century BCE.

These last two points indicate the beginning of a new line of development continued in the Neo-Babylonian and Persian Period, namely the systematic observation and prediction of lunar, solar and planetary phenomena.

720 BCE

[Chinese](#) records of eclipses of the [sun](#) begin at this point.

ASTRONOMY

700 BCE

At about this period, in Mesopotamian [astronomy](#), aspects of Babylonian traditional knowledge of heavenly phenomena (i.e., MUL.APIN) were not remarkably different from, say, [Hesiod](#)’s level of knowledge.

ANCIENT CALCULATION

The stars of the “3 ways” (path of Ea, path of Anu, and path of Enlil) of the MUL.APIN series.

The “MUL.APIN” tablets summarize most of Babylonian astronomical knowledge exclusive of omens, from before the 7th century BCE. These tablets provide lists of secondary stars (secondary, that is, to fundamental stars, which are the ones that rise and set on the horizon) –the ziqpu stars– the ones that culminate (cross the meridian of the night sky) at the same time that fundamental stars are rising above the horizon. This list of ziqpu stars is scientifically important, because it provided a step towards a more precise measure of time.



ASTRONOMY

ASTRONOMY

At about this period, copies were made of the astronomical compendia I-NAM-GIS-HAR and MUL.APIN, of Babylonian origin, in Assyria.

As part of an effort to define the 12 months of the year, the definitive constellating of the ecliptic with 12 constellations.

The system of 36 stars marking the “three ways” gave way to a system involving 27-30 “normal stars” (that is, reference stars), placed along the ecliptic, that would serve as markers for the paths of the planets.

The series MUL.APIN and the related texts show significant astronomical advances, namely:

- The better ratio 3 : 2 of longest day to shortest night.
- The primitive calculation of the shadow length of an upright rod (gnomon).
- First steps towards the introduction of the zodiacal signs: constellations in the path of the [moon](#) and astronomical seasons.
- Determination of time intervals between the culminations of various stars.
- Accurate period relations are not to be found in the early texts. For example, the MUL.APIN compendium does not give a single period for the [sun](#), [moon](#) or planets, apart from the schematic year of 12 months of 30 days each. The situation changed rapidly during the Persian period.

690 BCE

January 22: [Halley's Comet](#) whipped around the sun, and this time it would pass Earth closer, at 0.213 astronomical units, than it had ever passed since 1266 BCE.

SKY EVENT



HALLEY'S COMET



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EDMOND HALLEY

687 BCE

The Lyrid meteor shower, the earliest such meteor shower of which we still have any record. This meteor shower would be again very prominent during April 1982, averaging up to 75 streaks per hour. The Thatcher comet, one of the two which appeared in 1861, is possibly the parent of this Lyrid shower.

SKY EVENT

650 BCE

circa 650 BCE: In Mesopotamian astronomy, there was a continuation of the tradition of daily observation of major celestial events.



ASTRONOMY

ASTRONOMY

648 BCE

April 6, 648 BCE: An [eclipse](#) of the [sun](#) was viewed by Archilochus.

630 BCE

circa 630 BCE: At about this period, in Mesopotamian [astronomy](#), the start of accurate systematic observations of the [moon](#) and planets and their positions with respect to the fixed stars.

ANCIENT CALCULATION

624 BCE

[Thales](#) was born in Miletos, a Greek colony along the shore of what is now Turkey.
(Or, was he born in 636 BCE?)

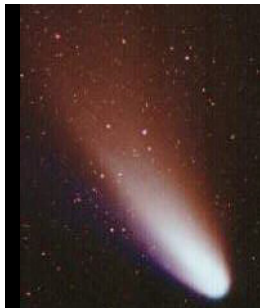
He would infer the Earth to be floating on water and would maintain all things come to be from water.
He would be believed to have been the teacher of Anaximander. He would be credited with five theorems of elementary geometry:

- A circle is bisected by any diameter.
- The base angles of an isosceles triangle are equal.
- The angles between two intersecting straight lines are equal.
- Two triangles are congruent if they have two angles and one side equal.
- An angle in a semicircle is a right angle.

616 BCE

July 28: [Halley's Comet](#) whipped around the sun, while [Thales of Miletos](#) was a lad of about eight years of age.

ASTRONOMY



HALLEY'S COMET



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EDMOND HALLEY

613 BCE

There is a good record from [China](#), that in this year a broom star, which is to say, a [comet](#), entered the Great Bear constellation.

ASTRONOMY

612 BCE

612-539 BCE: During this “Chaldean Period,” the main features of Zodiacal [astronomy](#) would be:

- Progress towards the division of the Zodiac into 12 signs of 30 degrees each.
- Systematic observation of the [moon](#) and the planets, their positions in relation to the fixed stars, their first and last visibility, stationary points, conjunctions, etc.

ANCIENT CALCULATION



610 BCE

610-546 BCE: Anaximandros of Miletus. Anaximander is sometimes designated the “father of [astronomy](#),” because he was the first to develop a cosmology by using mathematical proportions to map and interpret the heavens. Anaximander was born in Miletus and could have been a pupil of the philosopher Thales. Anaximander analyzed the origin of the cosmos with the theory of apeiron:

- The universe is boundless.
- The universe consists of a primary substance.
- He wrote influential works of biology, cosmology, and geography. He noted that human embryos initially appear fishlike.

600 BCE

circa 600 BCE: At about this period, earliest evidence of Babylonian influence upon Greek [astronomy](#) (seen in the names of the Zodiacal constellations).

Observations of [moon](#) and planets.

Start of developed mathematical [astronomy](#) (since this point in time everyone has always determined the positions of the stars and planets with respect to the ecliptic).

ANCIENT CALCULATION

1198 The rape of Helen by Paris, which, in 1193, gave rise to the Trojan war, and siege of Troy by the Greeks, which continued ten years, when that city was taken and burnt.

1048 David is sole king of Israel.

1004 The Temple is solemnly dedicated by Solomon.

896 Elijah the prophet is translated to Heaven.

894 Money first made of gold and silver at Argos.

869 The city of Carthage, in Africa, founded by queen Dido.

824 The kingdom of Macedon begins.

753 Æra of the building of Rome in Italy, by Romulus, first king of the Romans.

720 Samaria taken, after three years siege, and the kingdom of Israel finished by Salmanasar, king of Assyria, who carries the ten tribes into captivity.

The first eclipse of the moon on record.

658 Byzantium (now Constantinople) built by a colony of Athenians.

604 By order of Necho, king of Egypt, some Phœnicians sailed from the Red Sea round Africa, and returned by the Mediterranean.

600 Thales, of Miletus, travels into Egypt, consults the priests of Memphis, acquires the knowledge of geometry, astronomy, and philosophy; returns to Greece, calculates eclipses, gives general notions of the universe, and maintains that one Supreme Intelligence regulates all its motions.

Maps, globes, and the signs of the Zodiac, invented by Anaximander, the scholar of Thales.

597 Jehoiakin, king of Judah, is carried away captive, by Nebuchadnezzar, to Babylon.

587 The city of Jerusalem taken after a siege of eighteen months.

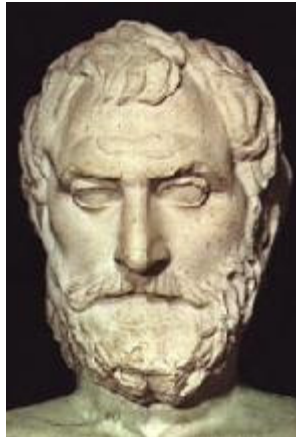
562 The first comedy at Athens acted upon a moveable scaffold.

“Hit the ball to the field of Apis” was inscribed on an [Egyptian](#) tomb (possibly as late as 500 BCE).

SPORTS

585 BCE

May 28, 585 BCE: A solar [eclipse](#) was allegedly predicted, and viewed by [Thales of Miletos](#).

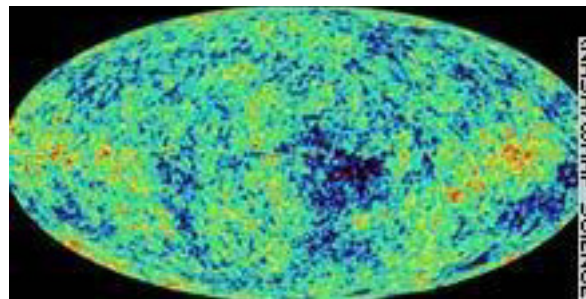


(During the Eclipse)

Allegedly, a battle between the Medes and the Lydians was interrupted by this sky event.

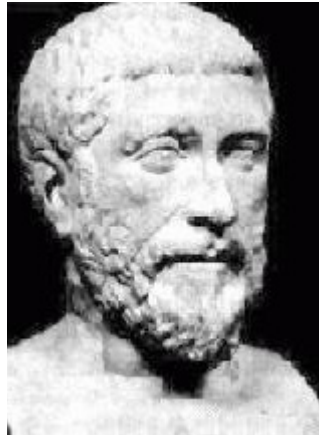
582 BCE

[Pythagoras](#), best known today for the “Pythagorean Theorem” that the square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the other two sides,⁵ was born on the island of Samos. He would found a school at Croton in southern Italy where he would teach that the structure of the universe was to be discovered with the aid of mathematics.




5. What we know as the “Pythagorean Theorem” had been known since ancient times in China as the “Gougu” theorem and in India as the “Bhaskara” theorem. This actually was old news by the *florut* of Pythagoras, since it had been discovered and utilized by Babylonian mathematicians at least 1,500 years before the guy had been so much as a gleam in his daddy’s eye. —Nevertheless, Morris Kline, an American historian of mathematics, has decried the mathematical knowledge of the ancient Egyptians and Babylonians as “the scrawling of children just learning how to write” (it was all Greece to Morris Kline, you see).

He famously said “all is number” — meaning that all existing things can ultimately be reduced to numerical relationships. His mystical preaching was on transmigration of souls and it is said that he did not like for his disciples to eat beans because, resembling embryos, this troubled his ideas on reincarnation.



574 BCE

In this year P/Tempel-Tuttle passed through our solar system, evidently without being recorded (the 1st observation of this periodic [comet](#) of which we presently have a record would not occur until 69 BCE .

When the Athenians voted to grant to [Solon](#) full powers as a reformer and as a lawgiver, his first concern was to relieve the immediate distress that was being caused among the populace by debt. He redeemed all forfeited land and freed all enslaved citizens, presumably by means of a declaration. This measure, known popularly as the “shaking off of burdens,” would be described by Solon in one of his poems:

These things the black earth ... could best witness for the judgment of posterity; from whose surface I plucked up the marking-stones [signs of a farmers' indebtedness?] planted all about, so that she who was enslaved is now free. And I brought back to Athens ... many who had been sold, justly or unjustly, or who had fled under the constraint of debt, wandering far afield and no longer speaking the Attic tongue; and I freed those who suffered shameful slavery here and trembled at their masters' whims.

(Solon's use of poetry as a means of statecraft would be echoed, in a much later timeframe, in Massachusetts, in the use of poetry as a means of statecraft by Friend John Greenleaf Whittier.)

The first written legal code of Athens, that of Draco (*circa* 621 BCE), was still in force. Draco's legislation had such severe (draconian!) penalties that they were said to have been set down not in ink but in blood. Death was the penalty for almost any criminal offense, and the result of not satisfactorily paying back a loan would often be enslavement. Solon's revisions to this code were posted on revolving wooden tablets for the public to read. He prohibited, for the future, the issuance of any loans that offered security in the borrower's person (that if the borrower did not repay on schedule with interest, he or members of his family could be sold into slavery). However, he also declined to redistribute the fields of Athens. Instead, he took action to make it possible for the marginal farmers who were being forced out to become traders or to enter a profession. So much of the city state's grain was being exported that not enough was left behind to feed the local population of Attica, and so he forbade the export of any produce other than olive oil. The circulation of a currency made up of pocket coins was a technology that was being pioneered during Solon's lifetime, and this he was able to stimulate through the local minting of an Athenian coinage. He introduced new weights and measures.



ASTRONOMY

ASTRONOMY

Up to this point, whether you were wealthy or poor was often estimated on the basis of whether your family of origin was part of the known local aristocracy. This was disadvantaging the new-money families, so Solon instituted a census of annual income, reckoned primarily in measures of grain, oil, and wine (the principal products of the soil), in order to classify the free men accordingly into four income groups. Under this new scheme, political privilege would be allotted without regard to the social standing of the family of one's origin. Any free man who was in one of the top two of the four new categories could occupy a high post in the government. Any free man who was in one of the top three of the four new categories could serve, a year at a time, on a new Council of Four Hundred, the function of which would be to prepare business for the Assembly. All free men regardless of category (no slaves) would be entitled to attend the general Assembly (*Ecclesia*), this functioning, at least potentially, as the sovereign body, entitled to pass laws and decrees, elect officials, and hear appeals from the most important decisions of the courts.

546 BCE

Thales died in the Greek colony of Miletos. He had taught that the Earth floats on water and all things come to be from water. He is believed to have been the teacher of Anaximander. He has been credited with five theorems of elementary geometry:

- A circle is bisected by any diameter.
- The base angles of an isosceles triangle are equal.
- The angles between two intersecting straight lines are equal.
- Two triangles are congruent if they have two angles and one side equal.
- An angle in a semicircle is a right angle.

544 BCE

In about the period from 544 BCE to 480 BCE, in Mesopotamia, there was coming about an increase in the accuracy of observations of the Zodiac, and of the periods of the planets. After establishing an accurate [lunar calendar](#), they began to apply their mathematical skills to tasks other than the astrological.

ANCIENT CALCULATION

[Heraclitus](#) was born in Ephesus, a Greek colony in Asia Minor.



He would be deemed “the obscure philosopher” (*skoteinos*) because of his sometimes cryptic utterances such as “Nature loves to hide” (*physis kryptesthai philei*). For him the essential substance that united all things was fire (as opposed to the “air” of Anaximenes or the “water” of Thales). His [astronomy](#) was that the cosmos consisted of an “ever-living fire kindling in measures and being extinguished by measures” (although due to the embarrassment that astronomy has progressed while philosophy has not, this early take on the cosmos is now being categorized as philosophy rather than astronomy). He taught that everything was in eternal flux due to contending opposites, and that “reality” was a trope for “harmony.” He summarized this doctrine of eternal change in the epigram “one cannot step twice into the same river” (this must sound better in the classic Greek, because in American English grammar one doesn’t poke one’s toe **even once** into **the same** river). For Heraclitus, the first principle of the world was not static “being” but dynamic “becoming” (which would perceive him, in modern terms, as having functioned as the original “process philosopher”).

540 BCE

May 10: [Halley’s Comet](#) whipped around the sun, while in [China](#), [Confucius](#) was a youth.

SKY EVENT



HALLEY'S COMET

This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY

539 BCE

539-100 BCE: The mathematical [astronomy](#) of the Neo-Babylonian, Persian and Seleucid Periods. The largest and most highly developed part of the theoretical astronomy of the Seleucid period is devoted to the computation of the new moons. The science of the Neo-Babylonian and Persian period had the following typical features:

- Systematic, dated and recorded observations of [eclipses](#) and lunar and planetary phenomena.
- Calculation of periods.
- Prediction of [eclipses](#).
- Division of the Zodiac into 12 signs of 30 degrees each.
- Rise of horoscope astrology.
- Development of mathematical [astronomy](#).

Significant achievements of this period:

- Determination of accurate periods for the [sun](#), the [moon](#), and the planets.



ASTRONOMY

ASTRONOMY

- Calculation of the motion of the [sun](#), the [moon](#), and the planets, of [eclipse](#) magnitudes and other lunar and planetary phenomena. (These calculations were based upon an admirable mathematical theory.)

ANCIENT CALCULATION

Certain lunar measurements were being made with regularity:

- When observing just after New Moon on the evening of first visibility of the crescent, the time between the setting of the [sun](#) and the setting of the [moon](#) on the evening of the first visibility of the crescent.
- When observing just before and after Full Moon, the time between the last setting of the [moon](#) before sunrise and sunrise, the time between the last rising of the moon before sunset and sunset, the time between sunrise and the first setting of the moon after sunrise, and the time between sunset and the first rising of the moon after sunset.
- When observing on the day of last visibility of the [moon](#) in the morning, the time between the rising of the moon and sunrise on the morning of last visibility of the moon just before New Moon.

500 BCE

At about this period, in Mesopotamian [astronomy](#), the first astronomical tables made their appearance. There began to arise “computed” texts such as lists of calculated ephemerides of the [moon](#) and planets. Ancillary “procedure texts” explained the methods of calculation being utilized.

At some point between 610 BCE and 470 BCE, most likely between 540 BCE and 470 BCE, they devised what we term their “System A,” which they used for the motions and positions of the [moon](#), Jupiter, Saturn, and [Mars](#).

ANCIENT CALCULATION

480 BCE

At some point between 500 BCE and 260 BCE, most likely between 480 BCE and 440 BCE, the Mesopotamians devised what we now term their “System B” for the calculation of the positions and motions of the [moon](#), Jupiter, Saturn, and [Mars](#).

ASTRONOMY

ANCIENT CALCULATION

479 BCE

March 14, 479 BCE: Xerxes's army witnessed a solar [eclipse](#).



467 BCE

From [China](#), and from Greece, a [comet](#) was observed — Plutarch would record that afterward a giant meteorite fell at Aegospotami.

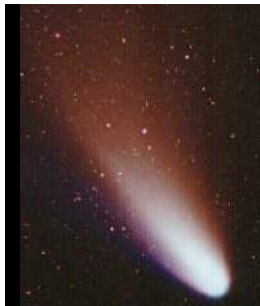
ASTRONOMY

466 BCE

July 10: [Halley's Comet](#) whipped around the sun. (For a long time we have had this appearance confused with the [comet](#) that had appeared in 467 BCE but now orbital calculations indicate that these had been in fact two quite different comets).

SKY EVENT

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HALLEY'S COMET




EDMOND HALLEY

462 BCE

April 30, 462 BCE: A solar [eclipse](#) was viewed by [Pindar](#).



447 BCE

In this year, as construction was beginning on the Parthenon in Athens, P/Tempel-Tuttle again passed through our solar system evidently without being recorded — the first observation of this periodic [comet](#), of which we presently have a record, would not be occurring until 69 BCE. 

ASTRONOMY

440 BCE

[Heraclitus](#) formed his theory of universal flux.





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430 BCE

circa 430 BCE: At about this period, in Mesopotamian [astronomy](#), the zodiac of signs was invented for use as a reference point.

August 3, 430 BCE: A solar [eclipse](#) was viewed by Thucydides. (Refer to THUCYDIDES 2.28.2.)

412 BCE

August 27, 412 BCE: A lunar [eclipse](#) was viewed by Thucydides.

400 BCE

circa 400 BCE: At about this period, in Mesopotamian [astronomy](#), most of the 48 Greek constellations and star names were being established.

Accurate methods of mathematical [astronomy](#).

During the 4th century BCE, the *CHOU PEI SUAN CHING*, or ARITHMETIC CLASSIC, would be appearing in [China](#). In this treatise, a Chinese prince and his astrologer discuss the manufacture of [calendars](#) and the properties of right triangles and fractions. Because their system relied on knowledge of base-five and base-ten instead of base-sixty, the Chinese mathematics appears to have been free of much, perhaps of any, Greek or Babylonian or Egyptian influence.⁶

391 BCE

September 14: [Halley's Comet](#) whipped around the sun. [Plato](#), who has been credited with having written a little poem on the subject of stargazing, may have seen this [comet](#) this time, but actually we have no preserved confirming record.

SKY EVENT

6. Although the ancient Babylonians had known about fractions well before the Chinese, and the Chinese had known about fractions well before the Greeks, Morris Kline, an American historian of mathematics, has derided the mathematical knowledge of the ancient Egyptians and Babylonians as “the scrawling of children just learning how to write”!

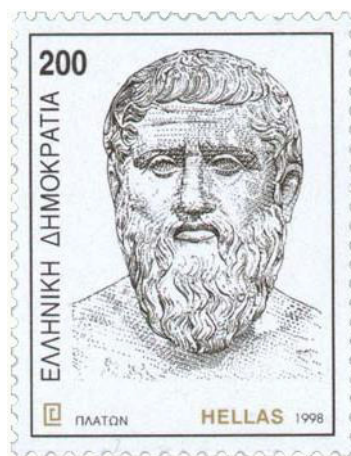
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HALLEY'S COMET




EDMOND HALLEY

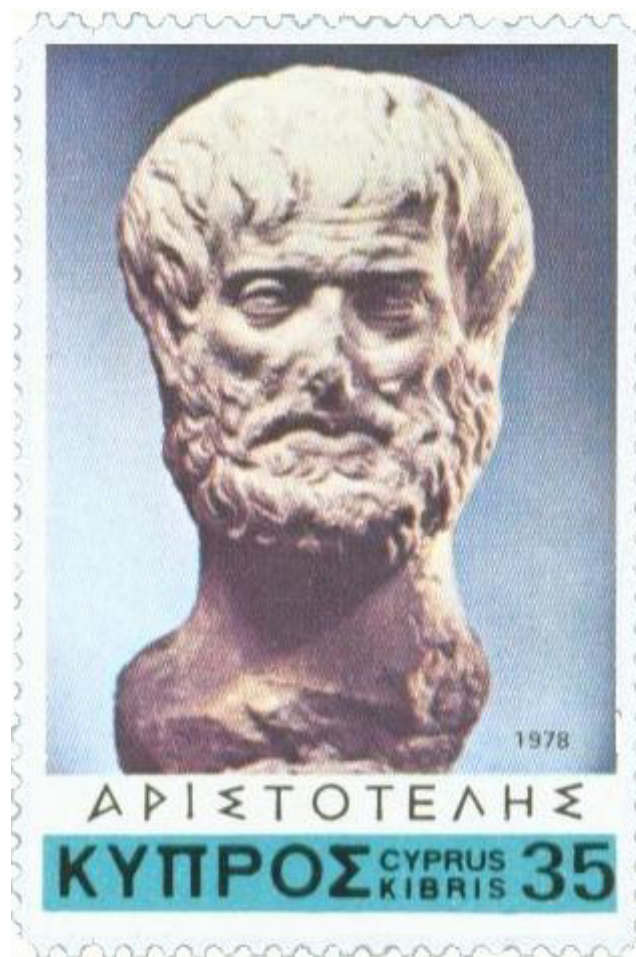


373 BCE

Meng-tzu or, in Latinized form, [Mencius](#), was born.

During this year, or the following year, or the year following that, a great Kreutz sungrazing [comet](#) made its appearance. This comet may have been one of the two largest pieces of the hypothetical body referred to as the “parent of the sungrazers,” later disintegrated, which may still have been in one large chunk during a visit to the inner solar system sometime between 18,000 BCE and 8,000 BCE.  This 373 BCE sungrazer is also the comet which we suppose may later have split further, to produce the major 1843 comet and possibly also the major comet of the year 1580.

Observers in Greece noted that it was seen in the west during about the period in which a great earthquake and tidal wave were occurring at Achaia. [Aristoteles](#) of Stageiros later recorded that the [comet](#) had first been observed in the west near the sun, and that at that point its tail was extending a third of the way across the earth’s sky, which would be about 60 degrees (if ΑΡΙΣΤΟΤΕΛΗΣ himself made this observation, he was at the time twelve years of age).



It is possible that this is the same [comet](#) which [Seneca the Younger](#) alleged that Ephorus had described as



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splitting into two pieces (Seneca regarded the idea that a comet could fall apart as ridiculous).

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371 BCE

It seemed clear even to the naked eye that the [comet](#) that filled the skies, its tail stretching a third of the way across the heavens, had somehow split in two.⁷

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320 BCE

circa 320 BCE: At about this period, in Mesopotamian [astronomy](#), the development of lunar and planetary tables. (In lunar and planetary tables of the Seleucid Period, the only coordinates recorded are those for longitude and latitude.)

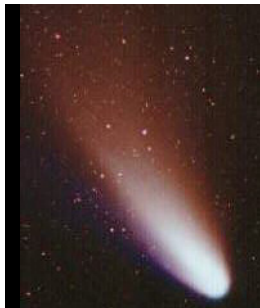
ANCIENT CALCULATION

315 BCE

September 8: [Halley's Comet](#) whipped around the [sun](#).

SKY EVENT

7. Brian Marsden has hypothesized that it was this comet that would become the progenitor of what he refers to as “Sub-group I” of Kreutz sungrazers (the Great Comet of 1843 being in this sub-group) — and that the sungrazer which would appear in 1106 CE would be the progenitor of what he refers to as “Sub-group II” of Kreutz sungrazers (the Great Comet of 1882 and the comet Ikeya-Seki of 1965 being in this group).



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EDMOND HALLEY

309 BCE

August 15, 309 BCE: An [eclipse](#) of the [sun](#) was viewed by Agathocles.

SKY EVENT



300 BCE

circa 300 BCE: At about this period, in Mesopotamian [astronomy](#), the development of a mathematical theory of planetary motions.

ANCIENT CALCULATION

The development of accurate predictions of lunar movement and lunar [eclipses](#).

The beginnings of true mathematical science, grounded in astronomical observations. The multiplicity of phenomenon were reduced to mathematical expressions to predict what would happen in the future. In Seleucid times two different systems (we now term them “A” and “B”) were in use to compute the course of the [sun](#) and [moon](#).

[Almanacs](#): “Observational” texts comprising monthly reports of certain astronomical phenomena (using Zodiacal signs as reference), and covering one Babylonian year.

Normal-Star [Almanacs](#): “Observational” texts similar in structure to the almanacs but using “normal stars” as reference.

Goal-Year Texts: “Observational” texts containing information for enabling the prediction of planetary and lunar phenomena for a given year.

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All classes of Seleucid astronomical texts contained at least some predictions. Non-mathematical astronomic texts of the Seleucid Period consisted of:

- [Almanacs](#)
- Normal-Star [Almanacs](#)
- Goal-Year Texts
- Diaries⁸
- Horoscopes
- Lists of lunar and solar [eclipses](#)



8. The “Astronomical” Diaries date back to the Late Assyrian Period (*circa* 740 BCE) and were the source of the other “observational” texts.

295 BCE

In about this year, in [Alexandria](#), [Euclid](#) was developing the elements of mathematics.



293 BCE

According to [Gaius Plinius Secundus](#) or [Pliny the Elder's](#) NATURAL HISTORY, the 1st Roman sundial.

NATURAL HISTORY, I

NATURAL HISTORY, II

NATURAL HISTORY, III

NATURAL HISTORY, IV

NATURAL HISTORY, V

NATURAL HISTORY, VI

THE DIAL

290 BCE

In [Alexandria](#), [Euclid](#) set out the principles of geometry.



282 BCE

282 BCE: Construction of the [Colossus of Rhodes](#), an act of worship aimed at obtaining the favor of mighty Helios the [sun](#) god, had required 12 years.

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The commission for the project had been awarded to the Rhodian sculptor Chares of Lindos. To build the statue, his workers had fabricated the outer skin parts as bronze castings. The base was of white marble, to which the feet and ankles of the statue had initially been fixed. The structure had then been erected section by section, with the bronze exterior being stabilized by an iron and stone framework within. It was necessary to put up a temporary earth ramp, to haul the higher parts of the Colossus into position. In this year, the statue was completed:

To you, O Sun, the people of Dorian Rhodes set up this bronze statue reaching to Olympus when they had pacified the waves of war and crowned their city with the spoils taken from the enemy. Not only over the seas but also on land did they kindle the lovely torch of liberty.

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It towered to about 110 feet (this would be an inspiration to Frederic-Auguste Bartholdi, whom we know for his [Statue of Liberty](#) in the harbor of New York City, towering 151 feet from the toes to the tip of the torch).



For 56 years this colossal Colossus would stand at or near their Mandraki harbor entrance,⁹ until the island would be hit by a strong earthquake in about 226 BCE. Rhodes would be badly damaged, and its famous giant statue would snap off at the weakest point — the knee. “But,” Pliny the Elder would comment, “even lying on the ground, it is a marvel.”

Not like the brazen giant of Greek fame
With conquering limbs astride from land to land;
Here at our sea-washed, sunset gates shall stand
A mighty woman with a torch, whose flame
Is the imprisoned lightning, and her name
Mother of Exiles.

From her beacon-hand
Glows world-wide welcome; her mild eyes command
The air-bridged harbor that twin cities frame,
“Keep, ancient lands, your storied pomp!” cries she
With silent lips.

“Give me your tired, your poor,
Your huddled masses yearning to breathe free,
The wretched refuse of your teeming shore,
Send these, the homeless, tempest-tost to me,
I lift my lamp beside the golden door!”

— Emma Lazarus, “The New Colossus” (1883)

9. To clear up a misconception, the Colossus did not bstride the entrance to the Mandraki harbor:



We know how tall the figure was and we know how wide the entrance was: no structure could have stood with such a straddle, nor would sailing vessels have been able to get their masts through without repeatedly striking such a figure in its crotch. Also, when the statue fell, its ruins did not block the harbor mouth. Probably it stood on the eastern promontory of the Mandraki harbor, if not farther inland.



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Inscription on the Statue of Liberty,
officially inaugurated in 1886

275 BCE

275 BCE: Mighty Babylon was no more. Who would have thought? A Colossus stood at the mouth of the harbor of the island of Rhodes in the Mediterranean Sea, as a bronze image of Helios the [sun](#) god. (This grand statue would stand for a couple of generations, shadowing the sails that passed by it — and then topple during an earthquake.)

260 BCE

At about this point in time, Aristarchus of Samos was estimating the distance and size of the Moon on the basis of the arc of the Earth's shadow cast upon the face of the moon during a lunar [eclipse](#). He thus established a basis for heliocentric cosmology

[Archimedes](#) (287-212 BCE) worked out the principle of the lever and discovered the principle of buoyancy. [Greek mathematician and physicist of Syracuse, noted for his work in geometry, hydrostatics, and mechanics; Archimedes's Principle is a law of physics stating that the apparent loss in weight of a body immersed in a fluid is equal to the weight of the displaced fluid; Archimedes's Screw is an ancient type of water-lifting device making use of a spiral passage in an inclined cylinder. The water is raised when the spiral is rotated.]



[Marcus Vitruvius Pollio](#) gives us the famous story of Archimedes and his detection of adulterated gold in a royal crown in the shape of a laurel wreath made for King Hieron II (270-215BCE) of Syracuse, his *M. VITRUVII POLLIONIS DE ARCHITECTURA LIBRI DECEM*, of 25 BCE — that when Archimedes realized that the volume of the laurel-leaf crown could be measured exactly by the displacement created in a bath of water he ran into the street with the cry of *εὐρηκα!* He was able to demonstrate that the king had been defrauded, presumably by the gold having been alloyed with some less costly material such as silver.

ASTRONOMY

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"I get my best ideas in the bathtub."



PREPARE FOR IT



*"Dans les champs de l'observation le hasard ne favorise
que les esprits préparés."*

— Louis Pasteur, at the University



of Lisle on December 7, 1854



240 BCE

[Eratosthenes](#) became the head librarian of the Great Library at [Alexandria](#). While there he would be authoring a comprehensive treatise about the world, which he would term GEOGRAPHY, “a writing about the earth.” Having heard that at the bottom of a deep well at Syene (near the Tropic of Cancer and the modern Aswan Dam creating Lake Nasser) sunlight could penetrate only on the summer solstice (June 21st, nowadays), knowing as he did the approximate distance between Syene and Alexandria as measured by the regular camel caravans (approximately 5,000 of the standard sports stadia in use by the Greeks, which is to say, about 800 kilometers), the scholar noticed that he ought to be able to calculate the circumference of the earth. He would measure the angle of the shadow in Alexandria on the solstice ($7^{\circ} 12'$) and divide this into the 360 degrees of a circle and then multiply the result of 50 by the known surface distance between Alexandria and Syene.



He would make mathematical errors in his calculation, but fortuitously these would cancel each other out! His calculation would produce a circumference of 25,000 miles, only slightly greater than what we know to be the actual circumference of the earth at the equator, which is 24,901 miles. A few centuries later, [Posidonius](#) of Apamea would suppose Eratosthenes’s circumference to be much too large. He would calculate the circumference on his own (using the greatest height of the bright star Canopus above the horizon, as seen from [Egypt](#) and from the island of Rhodes near the southwestern tip of Turkey) and would obtain a figure of 18,000 miles, which we now know to be 7,000 miles too short. Not long after Eratosthenes and Posidonius, [Strabo](#) – for reasons that now are unclear – would reduce the 250,000 stadia of Eratosthenes to 180,000 and would then carelessly write down that half this distance would amount to 70,000 stadia:

if of the more recent measurements of the Earth, the one which makes the Earth smallest in circumference be introduced – I mean



ASTRONOMY

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that of Posidonius who estimates its circumference at about 180,000 stadia, then... Posidonius suspects that the length of the inhabited world, about 70,000 stadia, is half the entire circle on which it had been taken, so that if you sail from the west in a straight course, you will reach India within 70,000 stadia.

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In the early 9th Century, Khalif El Ma'mun of Baghdad sent out two teams of surveyors to measure a north-south baseline and from this was able to calculate the approximate radius of the Earth in Arab miles. Ptolemy based a speculation on a later definition of the length of the Greek stadium, and confused the Arab mile used by Khalif El Ma'mun with the Roman mile, getting the measurement far too short.

Here is Ptolemy's image of the world, in a couple of medieval illustrations:



During the middle ages, most scholars would accept Eratosthenes's circumference in preference to Posidonius's or Ptolemy's. Christopher Columbus would prefer the shortest reported circumferences because this enabled him to raise venture capital by talking a good story. He promised the investors that, through sailing west from Europe, he would shortcut the distance to the spice ports of Asia and make them a fortune. Nobody knows whether Columbus really credited Posidonius's calculation over Eratosthenes's calculation. He was chock full of weird ideas, such as the location of the Garden of Eden, but in this case he may merely have been being Mr. Devious. After all, government cost-plus contractors typically underestimate on the first bid they submit to the government in order to get the contract and then later, as reality hits, try to renegotiate.

Columbus's behavior matches with that conventional behavior, observable even today, precisely.



ASTRONOMY

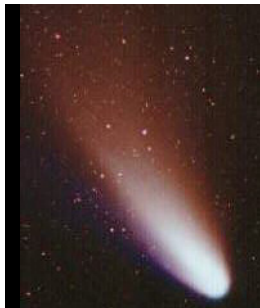
ASTRONOMY

May 25: [Halley's Comet](#) whipped around the [sun](#), and on this passage the [comet](#) was being observed and recorded both in [China](#) and in Mesopotamia.



Ch'in Shih-Huang Ti was emperor in China, and this was the 7th year of his reign. This was the emperor who joined several walls to create the Great Wall. This was the emperor who ordered the Burning of the Books, and slept in a different bedroom every night so that Death would not be able to find him.

SKY EVENT



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EDMOND HALLEY

200 BCE

circa 200 BCE: At about this period, in Mesopotamian [astronomy](#), ephemerides for the [moon](#) and planets.

ANCIENT CALCULATION

190 BCE

March 14: Per Livy's *AB URBE CONDITA* — a solar [eclipse](#) was observed in [Rome](#).

ASTRONOMY

168 BCE

June 21: Per Livy's *AB URBE CONDITA* — a lunar [eclipse](#) was observed in [Rome](#).

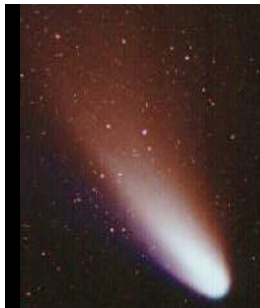
ASTRONOMY

164 BCE

November 12: [Halley's Comet](#) whipped around the sun. There are three clay Babylonian tablets which appear to be a record of its observation.

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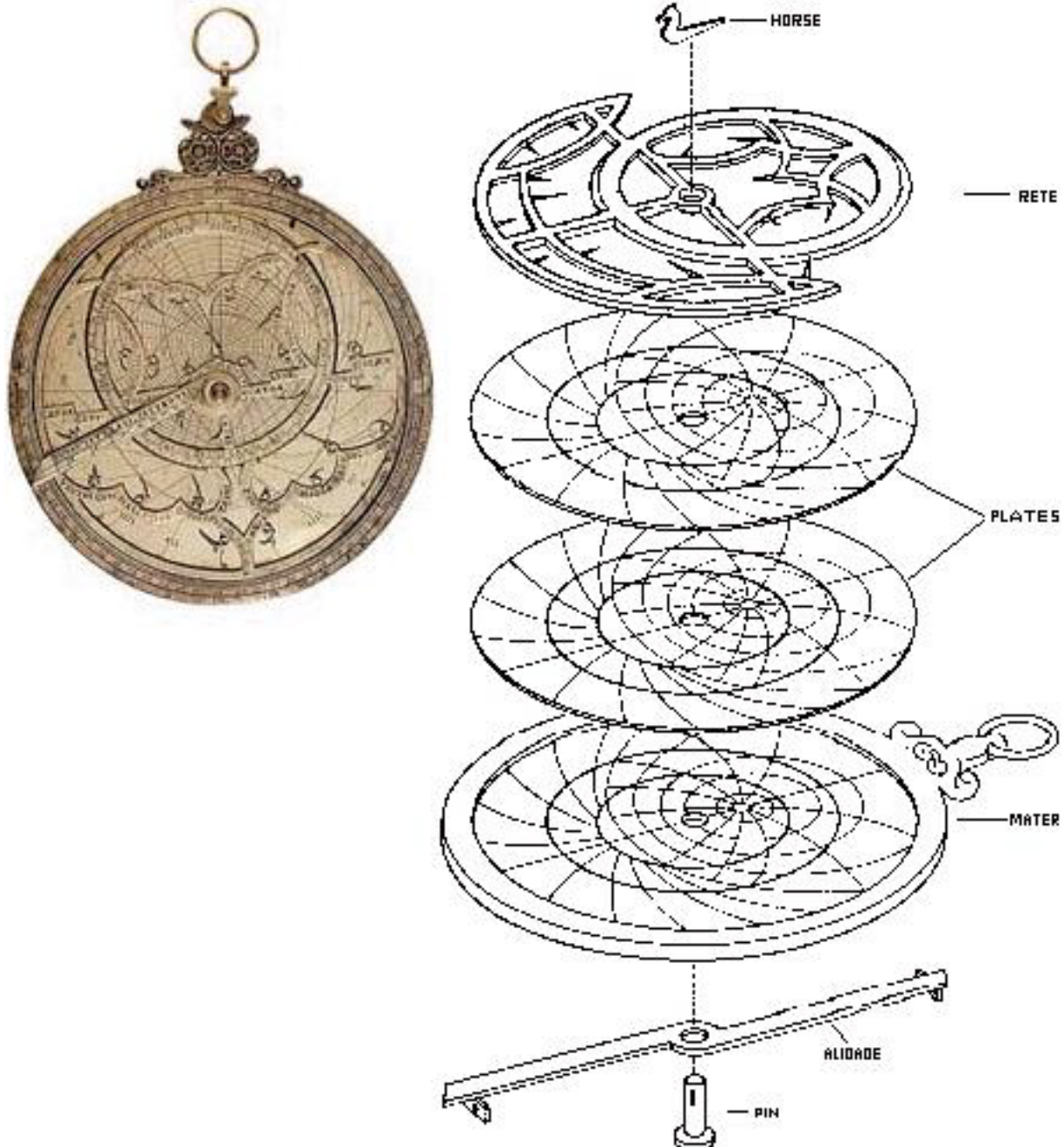
EDMOND HALLEY

ASTRONOMY

ASTRONOMY

150 BCE

Hipparchus perfected the [astrolabe](#), the principles of which had already been known. The ones that have survived the vicissitudes of time have ordinarily been made of brass, but the device could easily have been fabricated out of stiff paper and cardboard, or out of other materials. The front of an *astrolabe* has some fixed parts (these are time scales, and a stereographic projection of the sky as seen from a specific latitude) and some rotating parts (that simulate the daily rotation of the sky).





ASTRONOMY

ASTRONOMY

The most basic method used by a navigator to plot the course of the vessel is deduced or “dead” reckoning. Using the magnetic compass, continuous records are kept of the approximate directions traveled, and using the sand-glass, continuous records are kept of the approximate times elapsed while traveling in these directions, and by the use of a floating log tied to a knotted line, continuous records are kept of the approximate speeds of the vessel. Typically, the course of a vessel would be calculated hourly. When conditions became right for taking a celestial sighting, a dead reckoning might be revised. Another method is known as “latitude sailing” or “running down your easting (or westing)” — once the navigator reached a desired latitude, determined by sightings of some known celestial body such as the sun or the pole star, the course of the vessel was maintained at that latitude, sailing due east or due west. This required no elaborate tables of declination or complex mathematical calculations; all one needed to do was to maintain that celestial body at the same declination (angular height above the horizon). By latitude sailing one might reach one’s objective without any certain knowledge of one’s longitude, or its longitude — one needed only to keep sailing and keep a lookout. Christopher Columbus practiced latitude sailing on his 1492-1493 voyage, as did Vasco da Gama when he rounded Cape of Good Hope to arrive at Calicut, India in 1498. Celestial navigation — determining one’s latitude from observations of the sun or stars — provided greater flexibility. To the end of the 15th Century, the celestial body most often used was Polaris, for this did not involve the use of tables of declination. At first, only the meridian altitude of Polaris was used — that point when it reached its zenith in the sky. Later, navigators would be able to use Polaris at any time of the night without having to wait for it to reach its zenith. By the end of the 15th Century, mariners were determining their latitude from the sun as well as from the stars. Finally, with the development of a usable marine chronometer in 1761, navigators would be able in addition to determine longitude.

The main body of a typical brass *astrolabe* consisted of a brass disk about $\frac{1}{4}$ inch thick and about six inches or less in diameter, hollowed in the center and containing sets of thin brass plates. The ring around the edge of the disk (which is referred to as the *limb*) would be marked off in degrees. On European devices it is common to see this limb divided also into 24 hours, noon being at the top and midnight at the bottom. Inserted into the hollow in the disk (which is referred to as the *mater* or mother) is a plate (referred to as a *climate* or *tympanum*) engraved with circles of altitude and azimuth for the intended user’s local latitude. Such an instrument might contain several such *climate* plates, engraved on both sides, so that the *astrolabe* could be used at several latitudes. What the traveler would do was open the instrument and put the *climate* topmost in the *mater* that was probably closest to his latitude at that time. Over the *climates* is fitted a disk (which is referred to as the *rete* or net) also made of brass, that is mostly cut away or pierced so the traveler could see the *climate* through it. There were pointers that indicated a number of fixed stars. A circle on the *rete* illustrated the sun’s annual path in the sky (this path is known as the *ecliptic*). That *ecliptic* circle is divided into 30-degree sections which indicate the signs of the *zodiac*. The *rete* is manipulatable so it can be made to rotate in one sidereal day to simulate the daily rotation of the stars in the sky. Pinned to the top of the *rete* was usually a rotating bar called the *rule*. The *rule* and the *rete* were held in position by this pin through the center of the instrument and the *rule* could be made to rotate over the *rete*. Screws not having as yet been invented, you will probably notice that this pin is held in place with a wedge shaped like the head of a horse. The entire *astrolabe* was hung, for taking measurements of the sun or of a star, by a cord connected to a ring located at the top of the instrument. The top of the instrument, where this ring was connected, is called the *kursi* or throne. On European instruments the attachment mechanism was called the fixed *armilla* or ring, and there was in addition a swiveling *armilla*. The back of an *astrolabe* was usually engraved with a wide variety of scales, the nature of



which depended on where and when it had been fabricated. All such devices included scales for measuring angles and scales for determining the sun's longitude for any date, but there might be other helpful scales as well. Many of these devices sported a scale called the shadow square, by which one might solve simple problems of trigonometry. A cotangent scale, on Islamic devices, helped to determine the daily times for prayer, and in addition a scale helped to locate the *qibla* (the direction of Mecca). European instruments often included a scale by which the traveler might convert between unequal or "planetary" hours and equal hours. The back of each *astrolabe* included an *alidade*, by which the traveler could measure the altitude of celestial objects.

November 30, 2006, New York Times

Early Astronomical "Computer" Found to Be Technically Complex

By JOHN NOBLE WILFORD

A computer in antiquity would seem to be an anachronism, like Athena ordering takeout on her cellphone.

But a century ago, pieces of a strange mechanism with bronze gears and dials were recovered from an ancient shipwreck off the coast of Greece. Historians of science concluded that this was an instrument that calculated and illustrated astronomical information, particularly phases of the Moon and planetary motions, in the second century B.C.

The instrument, the Antikythera Mechanism, sometimes called the world's first computer, has now been examined with the latest in high-resolution imaging systems and three-dimensional X-ray tomography. A team of British, Greek and American researchers deciphered inscriptions and reconstructed the gear functions, revealing "an unexpected degree of technical sophistication for the period," it said.

The researchers, led by the mathematician and filmmaker Tony Freeth and the astronomer Mike G. Edmunds, both of the University of Cardiff, Wales, are reporting their results today in the journal *Nature*.

They said their findings showed that the inscriptions related to lunar-solar motions, and the gears were a representation of the irregularities of the Moon's orbital course, as theorized by the astronomer Hipparchos. They established the date of the mechanism at 150-100 B.C.

The Roman ship carrying the artifacts sank off the island of Antikythera about 65 B.C. Some evidence suggests it had sailed from Rhodes. The researchers said that Hipparchos, who lived on Rhodes, might have had a hand in designing the device.

In another *Nature* article, a scholar not involved in the research, François Charette of the University of Munich museum, in Germany, said the new interpretation of the mechanism "is highly seductive and convincing in all of its details." It is not the last word, he said, "but it does provide a new standard, and a wealth of fresh data, for future research."

Technology historians say the instrument is technically more complex than any known for at least a millennium afterward. Earlier examinations of the instrument, mainly in the 1970s by Derek J. de Solla Price, a Yale historian who died in 1983, led to similar findings, but they were generally disputed or ignored.

The hand-operated mechanism, presumably used in preparing

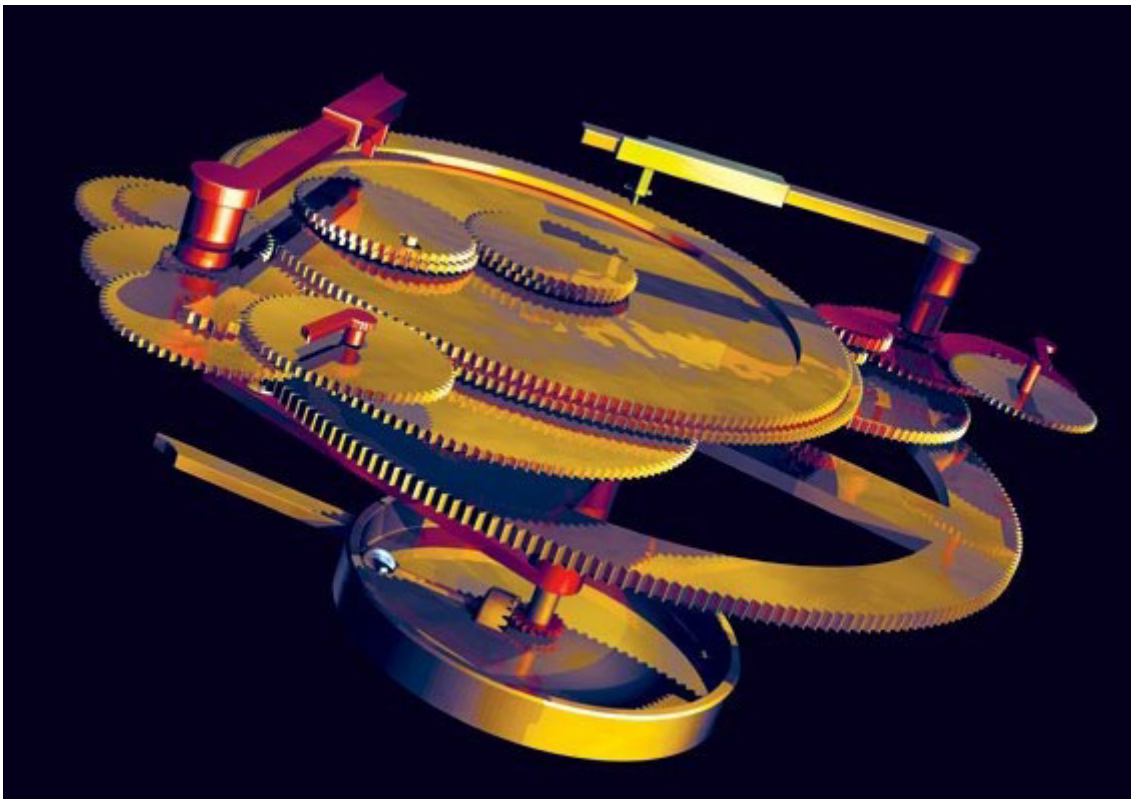
calendars for planting and harvesting and fixing religious festivals, had at least 30, possibly 37, hand-cut bronze gear-wheels, the researchers said. A pin-and-slot device connecting two gear-wheels induced variations in the representation of lunar motions according to the Hipparchos model of the Moon's elliptical orbit around Earth.

The numbers of teeth in the gears dictated the functions of the mechanism. The 53-tooth count of certain gears, the team said, was "powerful confirmation of our proposed model of Hipparchos' lunar theory." The detailed imaging revealed more than twice the inscriptions recognized earlier. Some of these appeared to relate to planetary and lunar motions. Perhaps, the team said, the mechanism also had gearings to predict the positions of known planets.

Dr. Charette noted that more than 1,000 years elapsed before instruments of such complexity are known to have re-emerged. A few artifacts and some Arabic texts suggest that simpler geared calendrical devices had existed, particularly in Baghdad around A.D. 900.

It seems clear, he said, that "much of the mind-boggling technological sophistication available in some parts of the Hellenistic and Greco-Roman world was simply not transmitted further."

"The gear-wheel, in this case," he added, "had to be reinvented."





ASTRONOMY

ASTRONOMY

147 BCE

June 28: A [comet](#) rounded the sun on this date.

ASTRONOMY

August 4: On this date the [comet](#) that had passed by the sun on June 28th should have been closest to the earth, but we have no dated record of it being seen at this point. The only Western record of observation of this particular periodic comet is one that happens to come down to us by way of [Seneca the Younger](#), of a bright reddish comet as big as the sun that had been seen after the death of the king of Syria, Demetrius, just a little while before the Greek Achaean war (which had begun in 146 BCE).

ASTRONOMY

August 6: The [comet](#) that had passed by the sun on June 28th and had been at its closest to the earth on August 4th was observed, from [China](#), to the southwest below the constellation of Scorpius, on this evening.

ASTRONOMY

August 8: The [comet](#) that had been observed, from [China](#), to the southwest below the constellation of Scorpius, on the evening of the 6th, was observed as having traveled north of Scorpius. Its tail at this point stretched 90 degrees.

ASTRONOMY

134 BCE

134 BCE: Hipparchus created the magnitude scale of stellar apparent luminosities.

ASTRONOMY

128 BCE

November 20, 128 BCE: An [eclipse](#) of the [sun](#) was viewed by Hipparchus.

SKY EVENT

87 BCE

August 6: [Halley's Comet](#) whipped around the sun, and this time observations seem to be recorded in [Chinese](#), in Babylonian, and in [Roman](#) sources. Marius was in power in [Rome](#) during this period. Probably, this apparition is what Gaius Plinius Secundus or [Pliny](#) the Elder would be writing about later, when he would write of a “terrible star, announcing no small shedding of blood in the consulate of Octavian” (meaning not the Octavian who would become Caesar Augustus but an earlier Octavian).

SKY EVENT

This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, [→](#) 1,057 BCE, [→](#) 466 BCE, [→](#) 391 BCE, [→](#) and 315 BCE, [→](#) but then on the 240 BCE [→](#) return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE [→](#) and again in 87 BCE, [→](#) and then it was recorded as being seen in 12 BCE, [→](#) 66 CE, [→](#) 141 CE, [→](#) 218 CE, [→](#) 295 CE, [→](#) 374 CE, [→](#) 451 CE, [→](#) 530 CE, [→](#) 607 CE, [→](#) 684 CE, [→](#) 760 CE (only by Chinese), [→](#) 837 CE, [→](#) 912 CE, [→](#) 989 CE, [→](#) 1066, [→](#) 1145, [→](#) 1222, [→](#) 1301, [→](#) 1378, [→](#) 1456, [→](#) 1531, [→](#) 1607, [→](#) 1682, [→](#) 1758, [→](#) 1835, [→](#) 1910, [→](#) and 1986 [→](#) – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



HALLEY'S COMET



EDMOND HALLEY

69 BCE

In this year P/Tempel-Tuttle was sighted and duly recorded — although of course nobody as yet knew what a [comet](#) was or that this was a periodic one or what its period was, or that it would eventually receive this name “Tempel-Tuttle.” [→](#)

Yet another battle involving our favorite pushy people, the [Romans](#): at Tigranocerta the legions of L. Licinius Lucullus defeated the army of Armenia under Trigranes, creating [the Pax Romana](#).



ASTRONOMY

ASTRONOMY

50 BCE

Supposing [Eratosthenes](#)'s estimate of the circumference of the earth to be much too large, Posidonius of Apamea had relied upon the greatest height of the bright star Canopus above the horizon, as seen from [Egypt](#) and from the island of Rhodes, and had produced his own estimate of 18,000 miles — which we now know to have been 7,000 miles too short.

ASTRONOMY

Posidonius of Apamea, while living on the island of Rhodes, had been accepted as a citizen and had once been trusted with the high office of prytanis, and had been part of an embassy that had represented Rhodes in Rome. He made at least one rather extensive tour, visiting Sicily and Liguria and venturing into Gaul beyond the Roman boundaries, and to Gades (now Cadiz) where he was able to figure out that the [moon](#) must be involved in the production of the Atlantic tides. Before his death he had composed a history of the world in LII volumes, beginning where Polybius had ended in 145 BCE, although all his works are now lost to us and we see them only in snippets of quotation found in the preserved works of other thinkers.

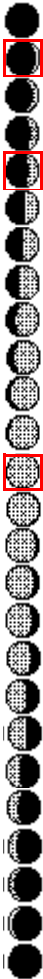
ASTRONOMY

46 BCE

46 BCE: Establishment of the Julian [solar calendar](#) made up of $365\frac{1}{4}$ days, with a leap year. (This had been previously attempted — but the previous attempt to establish such a calendar had failed due to lack of support.)

ASTRONOMY

44 BCE



March 15: On the Ides of March, Gaius [Julius Cæsar](#) the *Dictator Perpetuus* allegedly was assassinated by Brutus *et*



al in the Senate-house (or perhaps suffered a fatal epileptic fit). When Caesar's will is opened, it is discovered that he has adopted [Octavian](#) and designated him as his principal heir.

[Cleopatra](#) fled from [Rome](#) to [Alexandria](#) with her son by Caesar, [Caesarion](#). The civil wars would soon begin



again, with Brutus and Cassius at the head of the aristocratic party, and with the party of Caesar being led by Mark [Antony](#) and [Octavian](#) (afterwards [Augustus Caesar](#)):



We say this was 44 BCE although the [Romans](#) considered a year to have begun on the 18th birthday of Romulus, *circa* 750 BCE — so from their standpoint this was happening in the year 706 of the city of [Rome](#).

The Romans did not have a seven-day week and did not count the days of a month beginning with 1. Instead, the Roman monthly [calendar](#) was based on the first three phases of the moon, and three days of a month had unique names. Each month began with a day of the new moon referred to as the Kalends, the day on which



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bills were due for payment. (Romans were all about payment, and their KALENDARIUM was an account-book in which creditors entered the names of their debtors and the sums which they owed; this vital ledger was so called because interest on borrowed money was due on the Kalendae of each month.)

Then when the moon reached its first quarter that was the day of the Nones, this happening usually on the 5th or 7th of the month. A day referred to as the Ides would come on the 13th or 15th of the month, when the moon supposedly was full. (I say “supposedly” because the calendar in use was an accident waiting to happen, and kept drifting out of whack.)

They never counted in terms of days after, only in terms of days before. Their full phrase for “on the second of January” was “ante diem quartum nonas Januarias.” The phrase “ante diem,” commonly abbreviated as “ad,” might be omitted, the name of the day becoming “quartum nonas Januarias.” Thus:

- To refer to “March 1st,” in Latin, one says “the Kalends of Martius.”
- To refer to “March 2nd,” in Latin, one says “V Nonas Martius” or “5 days before the Nones of Martius.”
- To refer to “March 3rd,” in Latin, one says “IV Nonas Martius” or “4 days before the Nones of Martius.”
- To refer to “March 4th,” in Latin, one says “III Nonas Martius” or “3 days before the Nones of Martius.”
- To refer to “March 5th,” in Latin, one says “II Nonas Martius” or “2 days before the Nones of Martius.”
- To refer to “March 6th,” in Latin, one says “I Nonas Martius” or “the day before the Nones of Martius.”
- To refer to “March 7th,” in Latin, one says “the Nonas of Martius.” (The Nones was the 7th day in Martius, Maius, Quinctilis, and October, and the 5th in other months.)
- To refer to “March 8th,” in Latin, one says “VII Ides Martius” or “7 days before the Ides of Martius.”
- To refer to “March 9th,” in Latin, one says “VI Ides Martius” or “6 days before the Ides of Martius.”
- To refer to “March 10th,” in Latin, one says “V Ides Martius” or “5 days before the Ides of Martius.”
- To refer to “March 11th,” in Latin, one says “IV Ides Martius” or “4 days before the Ides of Martius.”
- To refer to “March 12th,” in Latin, one says “III Ides Martius” or “3 days before the Ides of Martius.”
- To refer to “March 13th,” in Latin, one says “II Ides Martius” or “2 days before the Ides of Martius.”
- To refer to “March 14th,” in Latin, one says “I Ides Martius” or “the day before the Ides of Martius.”
- To refer to “March 15th,” in Latin, one says “the Ides of Martius.” (The Ides was the 15th day in Martius, Maius, July, and Quinctilis, and the 13th in other months.)
- To refer to “March 16th,” in Latin, one says “XVI Kalends Aprilis” or “16 days before the Kalends of Aprilis.”
- To refer to “March 17th,” in Latin, one says “XV Kalends Aprilis” or “15 days before the Kalends of Aprilis.”
- To refer to “March 18th,” in Latin, one says “XIV Kalends Aprilis” or “14 days before the Kalends of Aprilis.”
- To refer to “March 19th,” in Latin, one says “XIII Kalends Aprilis” or “13 days before the Kalends of Aprilis.”
- To refer to “March 20th,” in Latin, one says “XII Kalends Aprilis” or “12 days before the Kalends of Aprilis.”



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- To refer to “March 21st,” in Latin, one says “XI Kalends Aprilis” or “11 days before the Kalends of Aprilis.”
- To refer to “March 22nd,” in Latin, one says “X Kalends Aprilis” or “10 days before the Kalends of Aprilis.”
- To refer to “March 23rd,” in Latin, one says “IX Kalends Aprilis” or “9 days before the Kalends of Aprilis.”
- To refer to “March 24th,” in Latin, one says “VIII Kalends Aprilis” or “8 days before the Kalends of Aprilis.”
- To refer to “March 25th,” in Latin, one says “VII Kalends Aprilis” or “7 days before the Kalends of Aprilis.”
- To refer to “March 26th,” in Latin, one says “VI Kalends Aprilis” or “6 days before the Kalends of Aprilis.”
- To refer to “March 27th,” in Latin, one says “V Kalends Aprilis” or “5 days before the Kalends of Aprilis.”
- To refer to “March 28th,” in Latin, one says “IV Kalends Aprilis” or “4 days before the Kalends of Aprilis.”
- To refer to “March 29th,” in Latin, one says “III Kalends Aprilis” or “3 days before the Kalends of Aprilis.”
- To refer to “March 30th,” in Latin, one says “II Kalends Aprilis” or “2 days before the Kalends of Aprilis.”
- To refer to “March 31st,” in Latin, one says “I Kalends Aprilis” or “the day before the Kalends of Aprilis.”

I should mention, however, that I fancy that Caesar was not assassinated on the Ides of March. I think what happened was that unexpectedly the guy had one of his epileptic fits, and croaked, and then his political cronies had suddenly to figure out how they were going to spin this — and they decided they would make this perfectly ordinary death appear as if it had been a foul assassination by their political rivals. My reasons for inferring that this was what happened is that they got a bit too dramatic, and a bit too superstitious, in their playing out of the scenario. For instance, they claimed the corpse had the exact number of stab wounds as the number of political-rival assassins whom they were entitled to hunt down and summarily off, in spite of the fact that upon autopsy this corpse was found to have only one fatal stab-wound. They claimed that their leader had known that he was in special danger on this day and yet had dismissed his bodyguard, to approach his known enemies against whom he had been warned entirely unarmed and unguarded. They claimed to have found a piece of parchment clutched in the cold bloody fist, that provided them with the names of the assassins — but this of course is so preposterous that today it would be presumed to be direct evidence of a frame-up. Since Caesar had been proclaimed as a deity, we can understand that for him to have become understood to have died of one of his epileptic fits would have been for him to have been unmasked as no deity at all, but instead revealed as an impostor — with the most extreme of political consequences for his cronies. An immortal may not die of some disgustingly ordinary illness; however, a man proclaimed immortal may yet die due to the agency of evil-wishing others. Therefore the political colleagues of this tin hero, I suspect, made a list of all the problem people, senators whom otherwise they would have needed to neutralize, and solved their two problems at once by inserting this list into the bloody grip. They solved their immediate problem, of how an immortal can perish and still be allowed as a deity, and simultaneously they solved totally their grand problem, of how to maintain their control over the city and the empire.

ASTRONOMY

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In May and June, in [China](#) and in [Korea](#), a reddish-yellow [comet](#) had been observed, with its tail spanning some 12 degrees in the northwest. Within a few days it was near the constellation of Orion, and it had a 15-degree tail that had rotated toward the northeast. THE COMET OF 44 BC AND CAESAR'S FUNERAL GAMES was published by Scholars Press on the ides of March in 1997, the 2,040th anniversary of Caesar's demise. Written by John Ramsey of the Classics Department and Lewis Licht of the Physics Department at the University of Illinois at Chicago, this study draws upon the sources in the Orient, as well as the Greco-Roman world, to shed new light on the probable orbit of the great daylight comet seen in the north for three to seven days in July 44 BCE during the games that [Octavian](#) was holding in honor of the supposedly assassinated Gaius [Julius Caesar](#) (actually, he may merely have had one of his epileptic fits and died in a manner very much unlike what we imagine as the apotheosis of a deity, after which his political colleagues made it look like a political assassination in order to be able to legitimate their killing off of a good bunch of the opposition politicians), and on the factors that caused it in this case to be treated not as a baleful omen but as a sign of Caesar's apotheosis. For details, visit <http://www.uic.edu/las/clas/comet>; or send e-mail to comet@uic.edu.



ASTRONOMY

In this period of the earth's history, there was no "North Star" marking the direction of the North Pole.

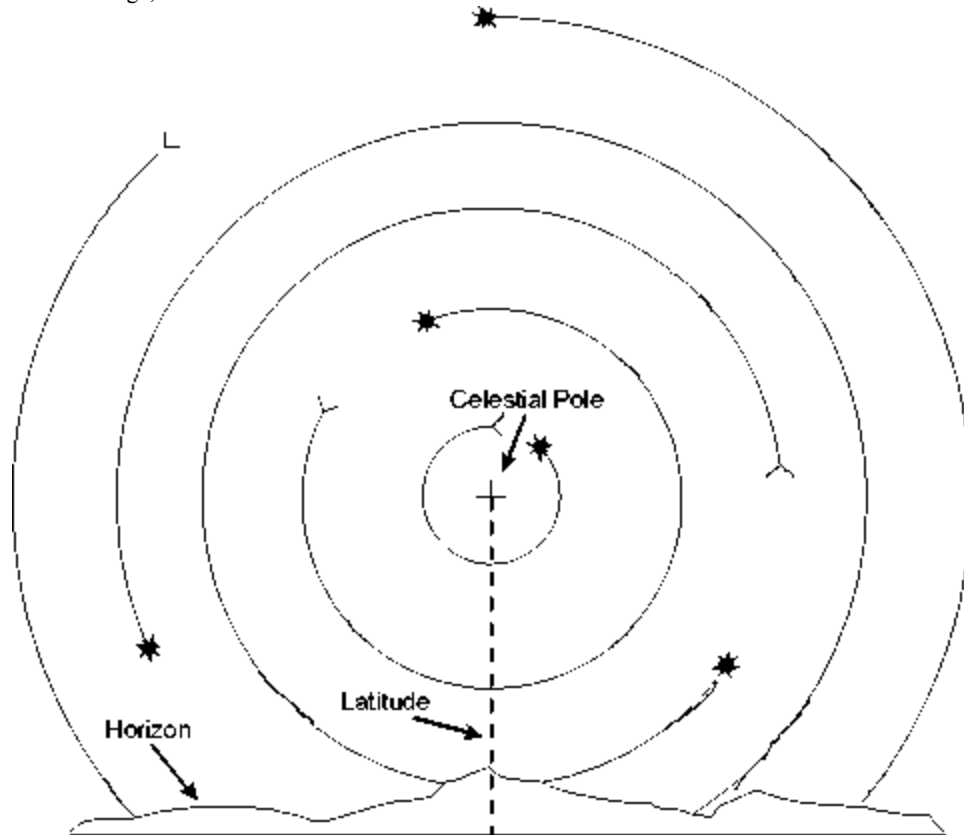
As constellations progress across the sky through the course of a single night, they change their orientation, but not their defining patterns, or their relative spacings. Waldo Emerson lauded this permanence:

"Teach me your mood, O patient stars!
Who climb each night the ancient sky,
Leaving no space, no shade, no scars,

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No trace of age, no fear to die.”



The changing appearance of the earth’s moon, however, has fascinated all cultures. Some have professed to be comforted by the faithful regularity of its gentle waxing and waning, fortnight by fortnight. Others, however, have been troubled by this as it is construed to be inconstancy in the heavens, which is exactly the wrong place for there to be inconstancy. Thus in William Shakespeare’s romance, when Romeo attempts a pledge on the moon, this is a wrong move as it does nothing but distress his Juliet:

Romeo:
 Lady, by yonder blessed moon I swear
 That tips with silver all these fruit-tree tops
 Juliet:
 O, swear not by the moon, the inconstant moon,
 That monthly changes in her circled orb,
 Lest that thy love prove likewise variable. (II.2.109-111)

Eclipses are not only changes, but because they bring darkness, they are an even worse sign of disaster. Having just murdered his wife Desdemona, Othello wonders how she can look so virtuous and wonders why no disruption in nature comes as a sign of the universe being so out of order:

...She’s dead...
 Still as the grave...
 I think she stirs again...
 My wife, my wife! I have no wife.
 O insupportable! O heavy hour!
 Methinks it should be now a huge eclipse
 Of sun and moon, and that th’ affrighted globe



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Should yawn at alteration... (V.2.115-125)

Comets show up at unpredictable times, thus upsetting the invariance of the universe, and so they obviously also are omens of evil to come. In “Henry VI,” the Duke of Bedford remarks upon the death of the greatest English hero, Henry V:

Comets, importing change of times and states,
Brandish your crystal tresses in the sky,
And with them scourge the bad revolting stars
That have consented unto Henry’s death. (I.1.2-5)

The planets are wanderers, and wandering is considered to be inherently disorderly. Disorder, in the heavens where only the perfection of order ought to appear, produces uncertainty and foretells disaster here below. As Ulysses observes in “Troilus and Cressida”:

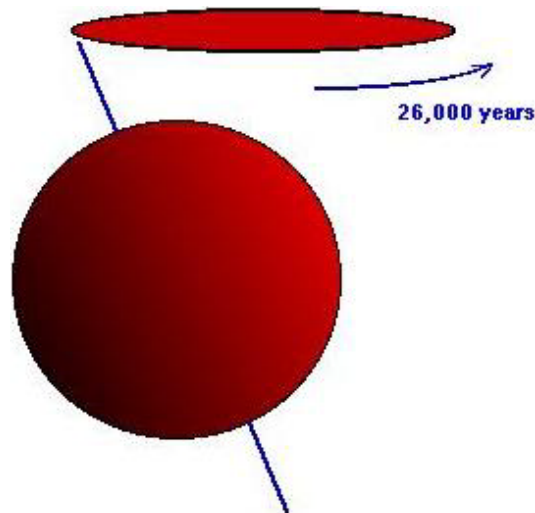
...when the planets
In evil mixture to disorder wander,
What plagues and what portents, what mutiny,
What raging of the sea, shaking of the earth,
Commotion in the winds, frights, changes, horrors,
Divert and crack, rend and deracinate
The unity and married calm of states
Quite from their fixture! (I.3.94-101)

In contrast, the playwright has his main Roman, in his tragedy “Julius Caesar,” affirm himself to be “constant as the Northern Star, of whose true fixed and resting quality there is no fellow in the firmament.” How stalwart is this politician Julius! When the conspirators pretend to plea that Gaius [Julius Caesar](#) should pardon the exiled Publius Cimber, great Caesar is entirely unswayed:

Caesar: I could be well moved, if I were as you
But I am constant as the Northern Star,
Of whose true fixed and resting quality
There is no fellow in the firmament.
The skies are painted with unnumbered sparks;
They are all fire, and every one doth shine.
But there’s one in all doth hold his place.
So in the world: ’tis furnished well with men,
And men are flesh and blood, and apprehensive.
Yet in the number I do know but one
That unassailable holds onto his rank,
Unshaked of motion; and that I am he
Let me a little show it, even in this:
That I was constant Cimber should be banished

And constant do remain to keep him so. (III.1.64-79)

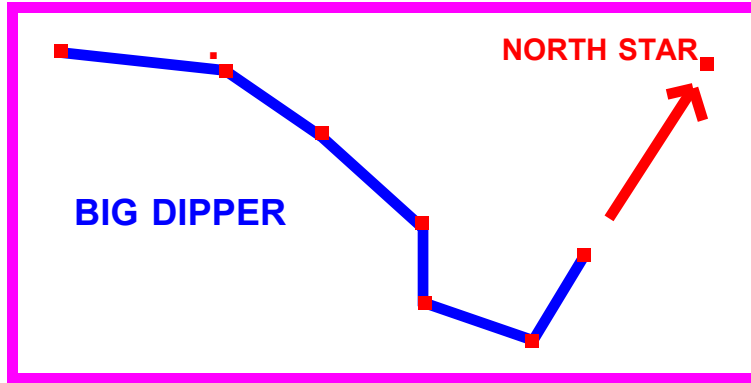
Shakespeare was, evidently, supposing the star Polaris, marking the earth's north pole, to be, as opposed to the planet's inconstant moon, some sort of gold standard of astronomical fixity — though in fact it is variable. Astronomers have known for some time that although this object 310 light years away from us now hangs in our sky roughly above the earth's North Pole, it has not always been in such a position, definitely will not in the remote future be in that position, and anyway, is a Cepheid variable the visibility of which can be expected to change markedly from time to time. The Earth's axis precesses (it is like a wobbling top), so in about 14,000 years, Vega (the brightest star in the constellation Lyra) will be the North Star, and then in another 5,000 years it will be Alpha Cephei (the brightest star in the constellation Cepheus), but at the completion of the entire cycle of 26,000 years — it will be Polaris again. This cycle known as precession is caused by the gravitational



attraction of the sun and the moon, acting on the fact that the planet Earth is not quite spherical. Back in the time of the Egyptian pharaohs, however it had another star, Thuban (the brightest star in the constellation Draco), that had functioned as this planet's North Star. Over time, as the axis of our planet has tipped, the constellation Draco had been moving along, and so by the 1st Century BCE, during the reign of Julius Caesar, there was no star at all in that polar position — only a pretend Caesar with the sensibilities of Shakespeare's era could have made such a remark about stellar constancy. For, by Shakespeare's era, Polaris had wandered into the region near the pole once occupied by Thuban — and Shakespeare, no astronomer, was presuming incorrectly that this had ever been so.

A "Cepheid variable" is a type of star that has almost exhausted its hydrogen fuel and is, consequently, caught in a cycle of bloating and collapsing. Polaris brightens or dims every four days or so, and over the period of time that we have been observing it, these pulsations have been slowing, with its period of oscillation between bright and dim lengthening by about eight seconds each year. Even on average, the brightness of Polaris has historically been unstable. For instance, over the past half a century it has now brightened on average by 10%, becoming a star of the 2d magnitude of brightness (magnitude is a scale devised by the Greek astronomer Hipparchus around 120 BCE ranking stars from 1st-magnitude bright, very bright and noticeable in the heavens, to 6th-magnitude dim, so dim as to be next to invisible — its change from 3d magnitude to 2d magnitude would indicate that Polaris has become about 2.5 times as bright as it had been a couple of millennia ago), but during Thoreau's 19th Century, it appears to have been on average about 20% dimmer even than before it began this current brightening trend. During the 16th Century, according to Tycho Brahe, it had been even dimmer. In 140 CE, when Ptolemy of Alexandria had made a star catalog, he had listed Polaris as a star of but the 3d magnitude, and in the 10th Century, when the Persian astronomer al-Sufi had checked Ptolemy's

evaluations, he had confirmed Ptolemy's evaluation of Polaris as a star of merely the 3d magnitude.



Actually, it is incorrect to refer to the Big Dipper (in England this is known as “the plough,” to American slaves it was “the drinking gourd”) as a constellation. Among the 88 groups of stars that are officially recognized and listed as constellations, there is of course the constellation Ursa Major. The Big Dipper, however, is merely a conspicuous portion of that constellation. Such a star pattern as the Big Dipper is referred to as an asterism, rather than as a constellation. This asterism is presently helpful, for it presently helps us to identify Polaris, the North Star. Two bright stars mark the outer edge of the bowl of the Big Dipper. These two stars –Dubhe and Merak– we term the Pointer Stars, due to the fact that they direct our eyes toward Polaris. Draw a line across the night sky, in your imagination, between these two stars, and then prolong this line about 5 times, and your eyes will arrive at a moderately bright star. Polaris. –But that is merely for the present, as, of the seven stars that make up this asterism, five of the closer ones (78 to 84 light years from Earth) are swarming through space at roughly the same speed and in the same direction, but two of the farther away ones (Alkaid, 101 light years from Earth, and Dubhe, 124 light years from Earth) are moving at a different speed in an opposite direction. Due to these differing motions, the asterism now known as the Big Dipper will eventually tear itself apart. The bent handle will bend even more, while the spreading bowl will spread even more. In 50,000 years there will no longer be a recognizable dipper shape.

There remains an unanswered question, however. Why would it have been that, in [WALDEN](#), Thoreau identified the pole star as having the name Kalpa? –For, in Hindu cosmology, “Kalpa” is not the name assigned to any object, but instead is the name assigned to a very lengthy period of time.



ASTRONOMY

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WALDEN: There was an artist in the city of Kouroo who was disposed to strive after perfection. One day it came into his mind to make a staff. Having considered that in an imperfect work time is an ingredient, but into a perfect work time does not enter, he said to himself, It shall be perfect in all respects, though I should do nothing else in my life. He proceeded instantly to the forest for wood, being resolved that it should not be made of unsuitable material; and as he searched for and rejected stick after stick, his friends gradually deserted him, for they grew old in their works and died, but he grew not older by a moment. His singleness of purpose and resolution, and his elevated piety, endowed him, without his knowledge, with perennial youth. As he made no compromise with Time, Time kept out of his way, and only sighed at a distance because he could not overcome him. Before he had found a stock in all respects suitable the city of Kouroo was a hoary ruin, and he sat on one of its mounds to peel the stick. Before he had given it the proper shape the dynasty of the Candahars was at an end, and with the point of the stick he wrote the name of the last of that race in the sand, and then resumed his work. By the time he had smoothed and polished the staff Kalpa was no longer the pole-star; and ere he had put on the ferule and the head adorned with precious stones, Brahma had awoke and slumbered many times. But why do I stay to mention these things? When the finishing stroke was put to his work, it suddenly expanded before the eyes of the astonished artist into the fairest of all the creations of Brahma. He had made a new system in making a staff, a world with full and fair proportions; in which, though the old cities and dynasties had passed away, fairer and more glorious ones had taken their places. And now he saw by the heap of shavings still fresh at his feet, that, for him and his work, the former lapse of time had been an illusion, and that no more time had elapsed than is required for a single scintillation from the brain of Brahma to fall on and inflame the tinder of a mortal brain. The material was pure, and his art was pure; how could the result be other than wonderful?

PEOPLE OF
WALDEN

ARTIST OF KOUROO

42 BCE

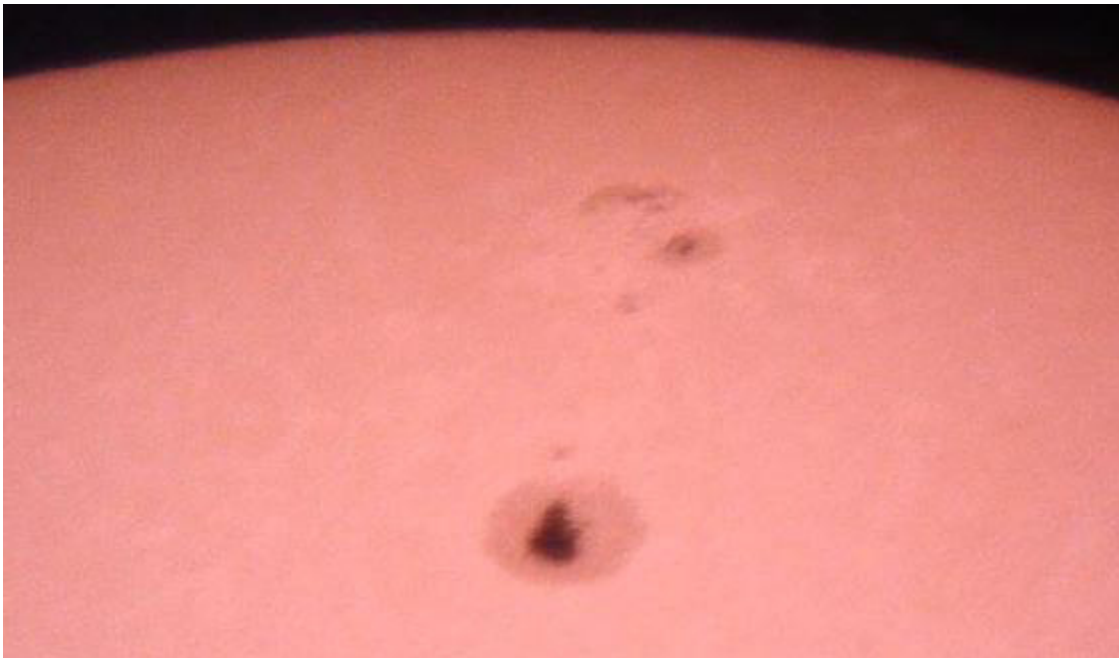
January 1: Gaius [Julius Cæsar](#) was proclaimed as a god, on the basis of the great daylight [comet](#) that had been seen in the north for three to seven days in July 44 BCE during the games that [Octavian](#) Caesar had been holding in honor of his adopted father. By virtue of this declaration, of course, [Octavian](#) Caesar automatically became a *divi filius*, which is to say, a “god’s son.”

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28 BCE

28 BCE: When the prevailing winds carry high dust over [China](#) from the deserts of central Asia, it is possible to look directly at the darkened [sun](#) and, without the use of a telescope, detect the largest of the sunspot groups. In this year some apparent references to [sunspots](#) were made by Chinese astronomers.

ASTRONOMY



25 BCE

Origin of the Roman “planetary week,” the days of which were named in honor of Saturn (Saturday), the [sun](#) (Sunday), the [moon](#) (Monday), [Mars](#), Mercury, Jupiter, and [Venus](#).

ASTRONOMY

12 BCE

September 10: [Halley's Comet](#) had reappeared in the skies, and at this point its tail lay across the Big Dipper.

SKY EVENT

This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



HALLEY'S COMET



EDMOND HALLEY

October 10: [Halley's Comet](#) whipped around the sun, and on this return the [comet](#) may well have been particularly impressive, as it had plunged past Earth at only 0.16 astronomical units. Evidently, later, Dio Cassius mentioned this return of the comet, when he wrote of one that had come in the year “before the death of Agrippa.” (This is a reference to Marcus Vispanius Agrippa, who died in 13 CE. The perennial popular perception, that it had been Halley's comet which appeared just after the death of Julius Caesar, is certainly incorrect.)



ASTRONOMY



ASTRONOMY

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3 BCE

September 11: According to THE BIRTH OF CHRIST RECALCULATED by Ernest L. Martin (a treatise which has been authored subsequent to the September 11, 2001 destruction of the twin towers of the World Trade Center in New York City by terrorists!), Jesus Christ's date of birth must have been September 11th (in 3 BCE, that is, precisely 2003 years before). This author is basing this calculation in part upon an [eclipse](#) of the [moon](#) that is known to have occurred shortly before the death of Herod because it was reported by Flavius Josephus in ANTIQUITIES. However, the reason why it never so much as occurred to anybody before, that this lunar eclipse might have been momentous, and that September 11th might actually be [Christmas Day](#), is that until the US was attacked on this day in this manner nobody had learned that this was a day of very special significance. The Moslem terrorists hadn't so much brazenly assaulted the United States of America, you see, as they had impiously assaulted the entire Christian religion. –The complete, perfectly airtight legitimization story for a Crusade! –Destroy the infidel!

SKY EVENT



THE STAR OF THE EAST

Tom Simms <tsimms@mailserv.nbnet.nb.ca>



Every wonder needs an explanation. To begin to explain the Star of Bethlehem, we must go forward from its time sixteen hundred years. Scientific inquiry about the event did not begin before then. Johannes Kepler, the noted German astronomer, flourished about the first quarter of the Seventeenth Century. He calculated that a conjunction of Jupiter and Saturn occurred in 7 B.C. He speculated that a retrogression of one to the other in addition to the conjunction may have happened. The arrival of Halley's comet had stirred him to action. He did not solve the mystery of Halley's comet but he solved many other mysteries of the heavens. Among those achievements, he set out laws concerning the motions of planets. Another astronomer, Edmund Halley, an Englishman, proved the periodicity of the comet at its next appearance. For doing so we named the comet for Halley. Now, let us go back in time. Halley's Comet appeared in 12 B.C. According to Babylonian records its previous appearance in 87 B.C. was noteworthy. Its path was roughly perpendicular to the horizon. It appeared to stand in one place evening after evening. Perhaps it followed a similar path on its next visit. We simply don't know. Perhaps that visit's path led to the conjunction or regressed conjunction of Jupiter and Saturn as later proposed by Kepler. If these events happened it would astound the students of the skies. Perhaps also a strange star appeared in the midst of the conjunction of Jupiter and Saturn. This would lead the astrologers of Babylon and Persian to foretell the rising of a King in Israel. Kepler argued from the astrologers' records he had at that time that Jupiter and Saturn referred specifically to Israel. Halley's Comet could have been the wandering star. However, we must consider other candidates. Halley's Comet on its most recent appearance was a bit of a bust to us. In 1910, it was nearly twice as close to earth as on this past flyby. On the earlier appearance the Comet was much bigger and brighter, exciting among many people panic and fear. Many of its previous appearances were also spectacular and often associated with great events. The Comet appeared in 1066 A.D. when the Normans invaded England. In 66 A.D. when it appeared, the Romans were beginning the subjugation of Judea leading up to the destruction of the Temple in Jerusalem in 70 A.D. and fortress Masada in 74 A.D. In 316 B.C. people took its appearance after Alexander the Great's death in 322 B.C. as an omen of his greatness. Its disappearance allowed his successors to continue fighting among themselves. Recently the Comet was 'found' in the British Museum on previously untranslated clay tablets. Until 1985, scholars had investigated carefully and made observations of Halley's Comet's every appearance only as far back as 12 B.C. The Greeks and Romans had poorly recorded earlier dates. Chinese records were fragmentary. Calculations allowed the years of appearances to be 87 B.C., 164 B.C., 240 B.C., and 316 B.C. The exact times were lacking. The translation of the clay tablets, almanacs from Babylon covering from 700 B.C. to 40 B.C. with



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some continuity, allowed scholars to call the exact dates for Halley's Comet in 87 B.C. and 164 B.C. They estimated its path through the constellations reliably. Some have taken Halley's appearance in 12 B.C. to be the Star of Bethlehem. They do this because the change from B.C. to A.D. is in error. In 525 A.D. the monk Dionysus Exiguus calculated the beginning of the Christian Era. In 1605 A.D. a Pole, Laurentius Suslyga, showed that the monk was in error by four years. Johannes Kepler, astronomer and mathematician to Rudolph II, Holy Roman Emperor, as already noted, calculated that the 7 B.C. 'great conjunction' had been a 'triple conjunction'. Kepler did this shortly before Suslyga announced the error. A four year error leads to the date of 5 B.C. for the birth of Jesus. (If this is so, and the year 1 A.D. is 5 B.C., then the next Millennium or 2001 actually is, let's see, counting back, say, 2000, 1999, 1998, 1997, and 1996. 1995 ends the second Millennium. 1996 begins the Third Millennium!) This encouraged him and others to discuss the possibility of the conjunction being the Star of Bethlehem. Kepler realized his error. Others have not, even until today. Two or more planets may move to within several moon diameters of each other in the sky. Astronomers call such an event a conjunction. A conjunction occurring three times in a year, is a triple conjunction. The conjunctions of Jupiter and Saturn in 7 B.C. occurred on 27 May, 6 October, and 1 December, according to modern calculations. As the court astrologer, the meaning of such events deeply interested Kepler. In his day such a conjunction had preceded the appearance of a supernova in the same vicinity. He wrote several tracts about this event. Unfortunately, many thought he meant that the Star of Bethlehem was that great conjunction. However, Kepler felt the Star of Bethlehem was a nova or supernova, a newly appearing or suddenly brightening star. (Novas and supernovas are suns in far off galaxies exploding for various reasons.) Now we must go ahead from Kepler's and Halley's times to today so we may then go back two thousand years or so. Chinese astronomical records ceased to be fragmentary in the First Century B.C. The records only recently became widely available outside of China. They recorded a nova of forty days duration appearing near Alpha and Beta Capricorn in the spring of 5 B.C. Had Kepler known, he would have cried with delight! This event is too late for the present find of Babylonian tablets now at hand. The Babylonians likely noted it. We just haven't found the records. For another way of looking at the skies, recent publications of Omen Texts from Nineveh of the Seventh Century B.C. outline the meanings of planetary conjunctions as they concern events in Amurru (Greater Syria). The texts concern a time near the Babylonian Captivity of the Jews. More recent finds confirm that the planet Jupiter was the King planet and Saturn, the planet of the Saturday, or the Sabbath. The latter point still persists in the day's modern name. The connection to a King rising from people celebrating the Sabbath cannot be resisted. These conjunctions fit in with Kepler's Seventeenth Century astrological assessment that such astronomical events meant a king would arise in Greater Syria. Herod the Great had become King of Judea under the military influence of Rome and by marriage to a Jewish Princess, descendant of the Maccabees. At first, the Jews viewed him as



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an usurper. But he overawed the Sanhedrin by his bodyguard. Then he restored, rebuilt and enlarged the Temple, while scrupulously following the ritual Law. The Wailing Wall in Jerusalem today is the remains of the west foundation of his Temple. These works lessened his people's hatred of him, but did not end it. Near the end of his reign, Herod the Great greatly feared conspiracy against him within his family. He had his two sons by the Jewish Princess executed. Then fearing more plotting, he killed his eldest son just five days before his death in 4 B.C. The Slaughter of the Innocents related in the New Testament has a clear foundation in history. The Gospel tale merits serious comparison with Herod's murderous actions. Now consider the following. Magi were Zoroastrian priests who, in the days of the Persian Great Kings, marched with their fire altars at the head of the armies. They were expert astronomers, relying on the long Babylonian experience. In addition, they were adept astrologers and learned in the occult arts. We get our word 'magician' from 'Magi'. (Zoroastrians were monotheists whose influence on both Judaism and Christianity was important.) The appearance of Halley's Comet would excite such Magi to expect some great event. The movement of the Comet through the constellations of that particular visit might tell us what the Magi expected if we knew the significance to them of the omens of those constellations. However, that knowledge may be beyond recovery. The triple conjunction of 7 B.C. would really alert them! By the time 6 B.C. was over and they had sorted out all the omens, they would be on their way to Amurru, Greater Syria. Matthew has the Wise Men say, "Where is he that is born King of the Jews? For we have seen his star in the east, and we are come to worship him". Such words would inflame a king who slaughtered and schemed his way to the throne. But such is speculation. If the Magi arrived in the spring of 5 B.C., the appearance of the nova as reported by the Chinese would amaze them if they had come for the astrological reasons already described. Certainly, the event would confirm for them the wisdom of making the trip. But then again, they may have come at the nova's appearance. They may simply have expected to receive much from a proud father-king. Fortune tellers always do when they bring good news. Herod the Great was old. His sons were grown. The Maccabean and Davidic lines of descent claims were equally good. Perhaps the Magi knew of Herod's dynastic worries. Many in an aroused population were hostile to Herod. With Bethlehem only a step from Jerusalem, the Eastern Magi would quickly learn of a scion of David newly arrived. Perhaps they knew of one before they came? As priests, the Magi, like Greek actors sacred to Dionysos, would enjoy diplomatic immunity. This was so even though they came from a region not subject to Rome and not friendly to her expansions. In fact, if the Christmas story had not related to these times, historians knowing of this trip would have assumed that the Magi were on a serious diplomatic mission. The Parthian Kings, who now ruled east of Rome's sway, and their Wise Men had control in Iran. These Kings would likely know of unrest in Palestine. They might suppose their emissaries might find legitimate claimants to the throne of Judea. The new star of the spring of 5 B.C. was a nova. The men of the East would not have known it would appear. The idea of a conspiracy is not possible. Taking



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advantage of an unexpected and unusual event would be good politics. There is another point to consider. Very recent speculation suggests that Auroras, or Northern Lights, often appearing with eerie sounds, may have been the angel choirs of the Bible. Conjunctions of major planets visible only from the sun might have disturbed the solar winds and surface storms enough to cause Auroras as far South as Palestine. If computer reconstructions make such storms possible for that spring, the date is even more likely. A hostile foreign king could create real disorder by his men acting on and pointing out omens and portents in the stars. He could find a pretender and set him up in exile. Then he could hope to reap the benefits. Damascus had a large Jewish population and Babylon an even larger one. Only a small proportion of Jews returned after the Exile. Egypt had large colonies of them. Jews made up the largest group of the population of Ptolemaic Alexandria. Throughout the whole region the enemies of Rome must have known the real state of affairs in Judea. By now some will object. We celebrate Christmas in December. But the fact is, shepherds did not tend their flocks in the winter in Palestine, even if the sheep could take the cold. This fact brings Luke's tale of the Shepherds into harmony with the advent of a new star in the spring of 5 B.C. Here is a clincher. Matthew wrote the Magi said, "...for we have seen his star in the east, ...". Without laying out the arguments about the meaning of the Greek and of the Aramaic on which it is based, translators take the meaning to be, "in the eastern sky". The Nova appeared for its forty days in the midst of Alpha and Beta Capricorn. The Magi would use the conventions of astronomy of that time. They would say the star was in the eastern quarter of the sky. The date of 25 December fell into use early because people celebrated then the natal day of both the pagan gods Mithras and Sol Invictus. Christians could celebrate unnoticed among the pagans. The Saturnalia of the Romans began on 21 December. It went on wildly for five days. This provided more cover for the followers of the new religion. Philocalus gave December 25 as the day of birth in his calendar of 366 A.D. The notice shows how early people lost the real date. In Rome, people knew nothing of the habits of shepherds in the hills outside of Bethlehem. Neither did they know anything about the star nova in the spring of 5 B.C. Rome's unawareness made the traditional date quite wrong. Historians, however, have to concern themselves always with conflation in ancient tales, *post factum* syncretism. Matthew wrote about 80 A.D. or shortly after. Halley's Comet had returned within his memory. Tiradates the Parthian King had taken Magi on an embassy to Nero in 40 A.D. Matthew and his people must have known this. This doesn't cut out the star and Wise Men story. They remembered the events of 5 B.C. 'Just as' they remembered more recent events. They quickly left out 'just as'. Such conflation makes the detail of Matthew's account suspect. It doesn't destroy the star appearance or Wise Men visit. Holy Family visit stories occur in legend everywhere in Egypt. They happen too often for it not to have taken place. The Wise Men's gifts were plenty for a trip to Egypt and a long sojourn there, sort of an American Express card of those days for a young family. The traditions of the Coptic Church in Egypt about the stay there ought to receive



more attention.

For two Christmas seasons in series I attempted to “put down” this fellow Tom Simms, above, who had been publicly proclaiming, I consider incorrectly, that Oriental records indicate that the “Star of Bethlehem” had been being observed there on the other side of the planet as a “nova.” It took a great deal of investigation to demonstrate (to everyone **except** this fellow, who remained convinced!) that his confident assertions had nothing at all going for them beyond his great confidence. I will include that correspondence below.

Recently the CrossTalk list heard **again** from Mr. Thomas M. Simms <tsimms@nbnet.nb.ca> his assertion that “the latest British Museum data” has it that “Chinese Astronomers” had recorded a “Nova ... in the Spring of 5 BCE.”

He provides us with citations having to do with a discovery of a Chinese or Korean record of an observation of a nova or “new star” which occurred in the spring of 5 BCE near Alpha and Beta Capricorn and which allegedly corroborated Matthew’s writing that the Magi had said “...for we have seen his star in the east,” Specifically what he says for the benefit of the Christian Christmas season is “The appearance of Halley’s Comet would have excited the Magi to expect some great event. The movement of the Comet through the constellations of that particular visit might tell us what the Magi expected if we knew the significance to them of the omens of those constellations. The triple conjunction of 7 BCE would really have alerted them! By the time 6 BCE was over and they had sorted out all the omens, they would be on their way to Amurru, Greater Syria. Matthew has the Wise Men say, ‘Where is he that is born King of the Jews? For we have seen his star in the east, and we are come to worship him.’ If the Magi arrived in the spring of 5 BCE, the appearance of the nova as reported by the Chinese would amaze them if they had come for the astrological reasons already described.”

To the contrary, the question **actually** raised by these astronomers, in the references Mr. Simms provides, is, and I quote, how “could” such a record:

“represent an independent sighting of the Star of Bethlehem? This question remains one that astronomers, theologians, historians, and Sinologists still actively debate, and it will undoubtedly remain a question never answered. Nevertheless, every year as Christmas approaches, a host of well-meaning but often misdirected researchers come forward to argue publicly for the theory they favor.”

Chinese records do, and have always, supported the sighting of a celestial object in March and April of 5 BCE and then, possibly, another celestial object in the spring of 4 BCE. This 5 BCE celestial object remained visible for 70 days. It was at a right ascension of 20 hours 20 minutes, and at a declination of -15 degrees. Its galactic coordinate “l” was equal to 30 degrees and its angular distance from the galactic plane was -25 degrees. On a scale of 1 to 5, with 1 indicating the highest reliability, the current astronomers have this sighting on their chart with a relatively high reliability index of 2.

Does this substantiate Mr. Simms’s “Nova ... in the Spring of 5 BCE”? It most definitely does not. The ancient Chinese record in question says very clearly that this 5 BCE sighting was a sighting of a broom star, a “hui-hsing,” a tailed comet: “It’s body is a sort of star, while the tail resembles a broom.” The modern scientific evaluator of this record has the following warning to offer:

“Since the use of the term *hui* implies that the star had a definite tail, the probability of a nova or supernova being described is obviously very low.”

This source also offers that:

“Of the new stars in high galactic latitude, the five objects of 5 BCE, 61 CE, 64 CE, 247 CE, and 402 CE may



well have been comets since there is a possible allusion to motion or a tail.... In looking for possible supernovae, we are thus left with the new stars of 185 CE, 369 CE, 386 CE, 393 CE...."

This is exceedingly direct. There is no record of a nova event in the skies in the Oriental records in this timeframe, until the year 185 CE.

"A literal interpretation of the account belies a possible astronomical explanation, since no astronomical phenomenon could move 'ahead' (in this case south from Jerusalem to Bethlehem -- stars 'move' east to west), and stop 'over the place.'"

"There were no known spectacular comets during the period of interest, Halley's comet having last transited in 12 BCE."

"In 4 BCE another new star is recorded, in the same region of sky (certainly within about 20 degrees of the 5 BCE object's position). The positional proximity and same months of appearance have raised the question whether the second record was merely an allusion to the 5 BCE event misplaced in the historical records by a year, especially since similar possible errors in date are known. Even if the 4 BCE new star was a distinct event, there is again no compelling reason to believe it was a supernova, although there is a stellar remnant of a comparatively recent supernova in the same vague area of sky -- the only known binary pulsar...."

The astronomical argument for Mr. Simms's "Nova ... in the Spring of 5 BCE" would seem to reduce to something on this order:

- The Chinese persons recording this 5 BCE observation of a new temporary celestial object which they categorized as a broom star, a "hui-hsing," a tailed comet, rather than as a nova, a "k'o-hsiung" or guest star, failed to make a record of its direction of movement against the background of stars of this celestial object,
- Since they failed to make a record of its direction of movement, it did not have a direction of movement but was fixed in the sky in relation to the stars around it.
- Since it was fixed in the sky in relation to the stars around it, and since it was new and temporary, it was a nova rather than a comet. The record they created used the wrong characters of their language.

Against this argument we can offer that in fact these ancient augurers did not always record the direction of movement of a comet, even in cases in which we are quite sure that it was indeed a comet that they had seen because they had drawn us a picture of what it looked like. Therefore, the fact that they failed again in this particular instance to leave us an enduring record of the direction of movement does not entail that the object had been fixed against the background of stars. Also against this argument we can offer that this precise location in the sky does not now appear to have any particular candidate shell of expanding gasses, does not now appear to have anything in it that we could point our telescopes at that would appear as the remnant of an ancient nova.

If we are to interpret the story in Matthew as containing an actual astronomical referent, the Chinese records of long standing would require us to hypothecate that the visit of the spectacular P/Halley in 12 BCE was followed by the extensive period during 7-6 BCE in which the angular separation between Jupiter and Saturn varied between one and three degrees so that the two planets appeared to be traveling as a pair, and was then followed by the appearance of a second and lesser **comet** event (not Mr. Simms's repeatedly proclaimed **nova**



event) in March/April of 5 BCE, which lesser comet passed across Alpha and Beta Capricorn rather than being confined within that area of the sky, and was then followed, possibly (if the record is not a simple clerical error) by the appearance of a nova which was not a supernova and which was in roughly the same area of the sky, in the spring of 4 BCE.

It would be appropriate for anyone who wants to make claims as to the actuality of the “Star of Bethlehem” in the Christian Christmas story to provide **the most meticulous documentation** for such allegations, demonstrating that at least this time around these recurring seasonal allegations have been founded upon real new evidence -- rather than upon the author’s wish-fulfillment fantasies. Those who fail to provide new citations should be ignored.

Christianity has a failure mode, in which the gospel stories, which work at the level of story, are extended into areas into which they simply were not fashioned in such a manner as to be able to do their work, such as the area of astronomy, the area of biological science, etc. Down through Christian history, well-meaning attempts to make these stories work at something other than this level of narrative (such as the one which you make by way of your false and indeed Orientalist fact claims as to historical evidence for a nova at the time of Jesus’s birth), have persistently been accompanied by suppression and persecution.

Have you seen the movie AMISTAD? The prisoners, in their cell, have a Bible with steelplate engravings, and one of the prisoners, none of whom speak English or know how to read, thinks he has the Gospel figured out. In the movie, his finger moves from engraving to engraving in this Bible, and he tells us, by voice, how he had figured out what this picture means. What he tells, of course, is the straightforward, simple, Gospel story. This is the level at which the materials **work**. I was so overcome by emotion in the theater that I almost gagged. I had to ask my wife for her handkerchief. This stuff **really works** when it is held with honesty at the level of story. I gasped out to my wife “If only it were true, if only it were true.”

So, let’s all hold these narratives at the primal, story level at which they do their **work**, shall we? Let’s cease and desist from all these dangerous attempts to bring these inspiring stories down into the muck of the real world, out of fear that bringing them down into this muck with us, even if done with the best of intentions, would merely destroy their great power over our spirits.

Here for the record are the sources upon which Mr. Simms relies, sources which to my own evaluation simply **do not** corroborate his assertion that Oriental records of a nova in 5BCE match up with the “Star of Bethlehem” reference in the Christian gospel narrative:

- Stephenson, F. R. and Walker, C. B. F., Eds. HALLEY’S COMET IN HISTORY. London: British Museum Publications, 1985.
- Sachs, A. J. and Walker, C. B. F. “Kepler’s View of the Star of Bethlehem and the Babylonian Almanac for 7/6 B.C. Iraq, XKVI, Spring, 1984, pp. 43-55.
- Stephenson, F. R., Yau K. K. C. and Hunger, H. “Records of Halley’s Comet on Babylonian Tablets.” Nature, (314, 18 April, 1985, pp. 587-592.
- Walker, C. B. F. “Halley’s Comet in Babylonia.” Nature, (314), 18 April, 1985, pp. 576-7.
- Walker, C. B. F. Personal Communication, 3 June 1985.
- Walker, C. B. F. Personal Communication 9 January 1986 which gave me the references noted below, confirming my views.
- D. H. Clark, J. H. Parkinson, F. R. Stephenson, “An astronomical reappraisal of the Star of Bethlehem”, QJRAS 18 (1977), 443-9:

“*Hui-hsing* means broom star or a sweeping star and is the term usually applied to a comet with a discernible tail (Stevenson, 1976). A description of a *Hui-hsing* generally makes mention of its motion, for example the Chinese record of Halley’s comet in 12 BC, likely to be made by the same group of astronomers, traces



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the comet's motions through more than ten asterisms, some 150 degrees (Ho, 1962). As the 5 BC record does not mention any motion it seems likely that this object may have been a nova and thus at a fixed celestial location, with a rayed appearance resulting from distortions within the eye which can occur for very bright objects. Several examples of such misclassifications have been found in the Chinese records (Clark and Stephenson, 1977), for example Tycho's supernova of 1572 AD was also described as a *Hui-hsing*."

Concerning the Korean 4 BC sighting, the authors give nearly a page of analysis before they sum up with "if the Korean report does refer to an event in 4 BC then it is unusual that more competent Chinese astronomers did not record it." (p. 446)

Stephenson and Clark's APPLICATIONS OF EARLY ASTRONOMICAL RECORDS (Bristol, 1978) gives a location for the 5 BC Nova. Assistant Curator (then) of Western Asiatic Antiquities (British Museum) Walker gives a long list of research citations on the subject in his Iraq paper, noted above, in footnote 11.

Here for the record is the manner in which Mr. Simms parses the above sources, a manner which I find both as tendentious as a Bactrian camel and as over-eager as a Christmas puppy:

What meaning would you give to a Nova appearing in between Alpha and Beta Capricorn a year after a Conjunction, similar to what we have seen already this month? I had a perfect view of the ultra conjunction SW from my place over Fundy at and after the sun set. Made me realize the astronomers and astrologers, they were by and large the same people, in 7 BCE would have read what you saw. Capricorn preceded Aquarius and Pisces according to a versification done by Aratus at the Macedonian court during the reign of Antiochus Gonatus there circa 270 BCE. The Right Ascension and Declination of the Nova in 5 BCE (for it was given no motion) located it for 70 days -- from beginning somewhere between 10 Mar and 5 April, IOW, disappearing in the interval between 19 May and 14 June that year. the Korean record of 4 BCE for a much shorter time period implies either the Koreans saw a flare of the Nova a year later or their year date is wrong, being near the beginning of their record keeping. The Right Ascension and Declination of the sighting calls the sighting a Nova, which supports the view that the Chinese saw the event as having a flare and not moving. IMO, from the other errors the Koreans made I'm inclined to agree either that they missed the first and much brighter event or they had the date wrong. It seems highly unlikely the Chinese who were old hands at the game would have missed a 70 day long event. However, the earlier conjunction event would start things humming among the "Magi". At a first sighting in mid-March Babylonians with Bactrian camels such as sped westward with the warrant for the death of Parmenion, the father of Philotas, guilty of conspiring for Alexander's murder. These camels, though not as fast as the Dromedary, could outtravel a horse --they could go with fewer waterings and feedings-- which is why Alexander sent them so Parmenion had no warning. (He



ASTRONOMY

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controlled Alexander's supply line.) Mind you, Bactrians needed 10 gallons of water a day but on a forced march they needed to fill up only every three days or so but in much larger quantities than a horse. The distance from Farah, where the conspiracy took place, to Parmenion in Ecbatan was over 800 miles!! If the Magi made equal time with Greeks in haste, all mounted, c. 25 to 35 miles per day, the trip from Babylon would take less than a month. Engels' ALEXANDER THE GREAT AND THE LOGISTICS OF THE MACEDONIAN ARMY, table 7, pp. 153-4, shows the rates.

Here are my reasons for doubting either the accuracy of the interpretation offered in the above sources which have persuaded Mr. Simms, or the accuracy of Mr. Simms's interpretation of those sources:

The argument that the East observed the Star of Bethlehem as a nova seems an interesting case of the general form, argument from negative evidence. Although we have been able to construct something by way of a table of historical comets, novae, and supernovae, with dates and descriptions and durations and inclinations and movements and suchlike details, and in some cases with actual drawings of the visual appearance of the object, from materials such as "silk books" and augury tortoiseshells or scapulae buried in Chinese and Korean tombs, the preserved evidence has at this point any number of lacunae, which is to say, blank cells still remaining in this modern constructed table due mostly (it might at this point be expected) either to deficiencies in the original observations or to imperfections in the chance preservation of that observational record.

Here is what I mean by deficiencies in the original observations. We are well aware that these observations were not conducted, or recorded, for the reasons for which we nowadays conduct astronomical observations. The texts which accompany them demonstrate that their purpose then was mere divination. Because of that simple fact, we may expect to discover that predictions of future events which turned out to be incorrect ("General Chou, if you attack northwest your forces will be swept forward by the currents of the heavens and will succeed.") will be underrepresented in the preserved evidence. We may expect what seemed then to be irrelevant detail, such as the direction of travel across the starfield of a comet which seemed to them not to have predicted anything of importance, also to be underrepresented in the preserved evidence.

One of the blank cells in this modern table of ancient sky events is for the direction of travel across the starfield of the particular *hui-hsing* [broom star, tailed comet: "Its body is a sort of star, while the tail resembles a broom."] which appeared in the year 5 BCE. Because this cell in the modern table is currently blank, and because comets travel across the starfield while novae and supernovae do not, some have chosen to infer that the ancient observation must have been of a nova rather than of a comet, preferring instead to interpret that the people who wrote down this observation simply did not know the difference between their character for comet, and their character *k'o-hsiung* for "guest star," that is, nova or supernova.

The core of Mr. Sims's argument, leaving out the Bactrian camels, seems encapsulated in his remark:

...the Nova in 5 BCE (for it was given no motion)...



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This is what I directly controvert. This is incredible at least in part because it tendentiously conflates lack of evidence with evidence of lack (if they recorded a motion we don't now know that they did, therefore we know that they did not record a motion). We should prefer to account for the absence of a record of the direction of travel of this comet across the starfield either by appeal to the problematic nature of the motivation of the original observers or by appeal to imperfections in the chance preservation of said observational record.

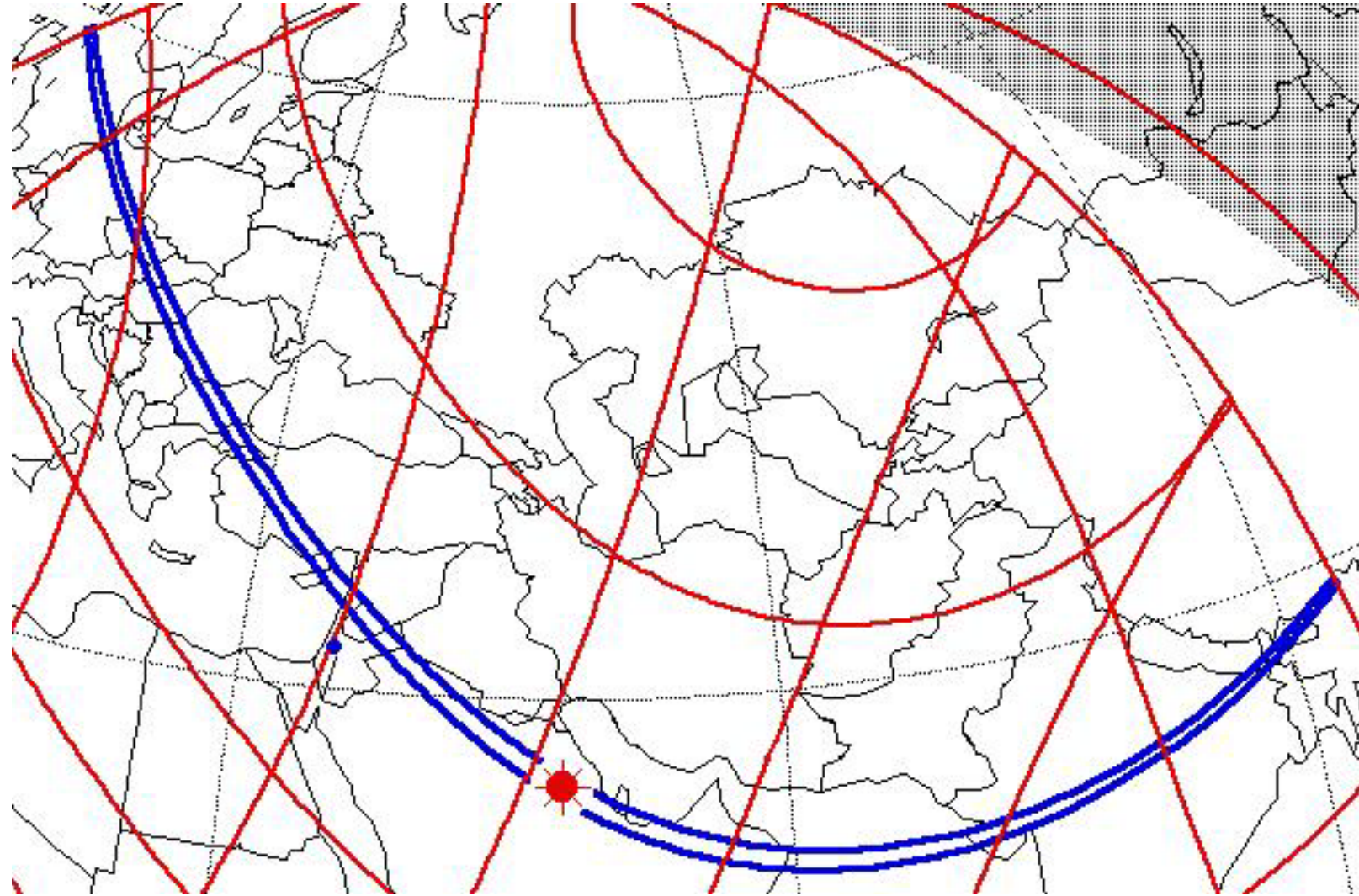
An attempt has been made to make up for this deficiency in the materials out of Chinese tombs by conflating them with early Korean records, specifically, by matching up a record dating to 5 BCE made in China with a record dating to 4 BCE made in Korea. This also, however, is substantially inferential rather than conclusive. The astronomers who now keep these astronomical records are well aware of the great publicity value that would obtain, should they be able to infer a historical record of the famed "Star of Bethlehem" and should they be able to use this star as the diadem of their own publication crowns, the pinnacle of their achievement as historical astronomers! However, they simply do not consider these evidences to support, in their present state, a nova event as the basis for the "Star of Bethlehem," but instead **warn us against** the people who rush around during every succeeding Christmas season with such inferences.

ASTRONOMY

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29 CE

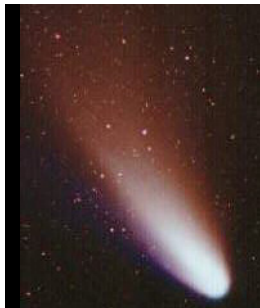
November 24: A total solar [eclipse](#) crossed Syria — and weather permitting would also have been visible in Jerusalem as a partial solar eclipse. It was viewed and reported by Phlegon.



66 CE

January 25: [Halley's Comet](#) whipped around the [sun](#), and would approach Earth more closely on its way out than it had on its way in. It would be described retrospectively by the Jewish historian Josephus as having hung “in the form of a sword over Jerusalem” (Jerusalem would be ravaged by a Roman army in 70 CE and Masada, the last Jewish stronghold, would be reduced in 73 CE).

SKY EVENT



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY

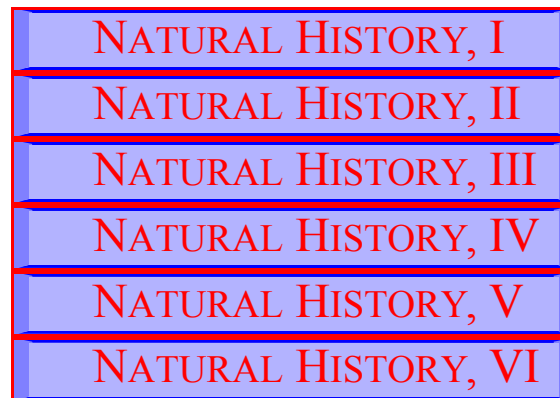


ASTRONOMY

ASTRONOMY

70 CE

At about this point Pliny Secundus or [Pliny the Elder](#) (Caius Plinius Secundus, 23-79 CE), in his NATURAL HISTORY, was discussing approximately a thousand different plants. Well known throughout the middle ages, this book constituted a major source of information on botany. Primarily a storyteller and historian, Pliny edited uncritically. Once the original, rarer source documents were discovered, the errors in Pliny's account became obvious.



PLANTS

That doesn't mean that Pliny was always wrong when he related a marvel. For instance, he reported that he had learned from certain monuments that milk and blood had rained from the lower part of the atmosphere not only during the consulship of Marcus Acilius Glabrio and Marcus Porcius Cato but also at other times, and that flesh had fallen from the sky in the consulship of Publius Volumnius and Servius Sulpicius, "and it is said that what was not devoured by the birds did not become putrid." There is no reason to doubt this ancient account as similar events have been observed during the modern era — it seems that the power of dust devils and waterspouts and tornados is adroit to scoop schools of small fishes from the surface layers of water and drop them flopping on suburban lawns, and to raise even heavy bodies into the air and there shred them to bits and pieces, and then transport these objects a distance through the upper atmosphere and deposit them as a rain of fragments in a calmer atmosphere.



WALDEN: Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness.... At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of Nature. We must be refreshed by the sight of inexhaustible vigor, vast and Titanic features, the seacoast with its wrecks, the wilderness with its living and its decaying trees, the thunder cloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.... I love to see that Nature is so rife with life that myriads can be afforded to be sacrificed and suffered to prey on one another; that tender organizations can be so serenely squashed out of existence like pulp, — tadpoles which herons gobble up, and tortoises and toads run over in the road; and that sometimes it has rained flesh and blood!

RAINS OF BLOOD, &C.

It is through Pliny that we know the exact costs of many products, and that farmers alternated crops of beans with spelt. He commented on the growing trend of farm land consolidation to create slave-maintained plantations.

BOTANIZING

Pliny's description of the manner of constructing mosaics makes us confident that **Marcus Vitruvius Pollio's** *DE ARCHITECTURA* was known to him — despite the fact that his name appears merely in the Table of Contents.

The betrothal ring originated earlier than the wedding band. The giving of an iron ring to mark a betrothal was a Roman custom. It was presumably a marker of the pledge, *pignus*, the contract between families that was to be fulfilled (such rings found in Christian burials in the catacombs of Rome appear to have been more commonly of bronze than of iron). At this point conservative custom still required a plain ring of iron, but the gold band would be becoming usual in the course of the 2d Century. "Even now," according to **Pliny's** *NATURAL HISTORY*, "the bridal ring is made of iron and without jewels." Pliny commended the ancient Romans for teaching women "modesty and sobriety" by condemning the wearing of gold "save on the finger, which, with the bridal ring, her husband had sacredly pledged to himself."

At about this point Hero of Alexandria was demonstrating by means of geometry, in *CATOPTRICA*, that a ray of light in reflecting from a plane mirror will follow the shortest path that it can possibly follow, between its source and the point of its observation.

(OK, how does it know to do that?)

HISTORY OF OPTICS



71 CE

March 20: An [eclipse](#) of the [sun](#) was viewed by Plutarch.

SKY EVENT

77 CE

Gaius Plinius Secundus or [Pliny](#) the Elder was a maker of detailed notes. He never married. He left 160 volumes of such material, on all kinds of scientific and antiquarian subjects — and that was over and above his NATURAL HISTORY. In that encyclopedia, released in this year, he was considering the following topics, declaring his opinion as to what constituted “the best” of each category of being:

- [astronomy](#) and meteorology
- geography of the Western Mediterranean
- geography of the Eastern Mediterranean, the Black Sea, continental and northern Europe
- geography of Africa, the Middle East and Turkey
- geography of Asia; summary overview and wrap-up of world geography¹⁰
- anthropology and human physiology
- land animals:
 - elephants, lions, tigers, panthers; cows, horses, asses, mules, sheep, goats; mice, dormice, etc.
- marine animals: whales, dolphins, fish, shellfish, etc.
- birds; animal reproduction; the senses
- insects; comparative zoology; fumbblings toward a taxonomy
- exotic plants, spices, and perfumes from India, Egypt, Mesopotamia, etc.
- more plants, such as aquatic plants
- plants: the vine and wine
- plants: the olive tree; oil and its uses; fruit and nut trees
- more trees (mostly evergreens)
- fruit trees and vines, and the art of planting them
- how to run a farm
- garden plants, with a long section on flax
- more about the garden plants, mostly vegetables
- flowers
- miscellaneous plants, including those that produce dyes
- medicinal properties of wine, vinegar, oil, nuts, and fruit
- medicinal properties of trees and herbs
- medicinal properties of herbs
- major medicinal herbs (begins with a section on new diseases)
- minor medicinal herbs, approximately in alphabetical order
- medicinal uses of the human body’s own products (with a discussion of charms);
 - medicinal uses of animal products
- medicinal uses of animal products, continued
 - (beginning with a long expression of hostility toward those who were styling themselves doctors)
- medicinal uses of animal products, continued (beginning with a consideration of magic)
- medicinal uses of marine products: salt, plants, sponges, etc.

10. Pliny knew of the existence of 10 volcanos, one of which was [Mount Vesuvius](#).



- medicinal uses of marine animals
- metals (mostly gold, silver, and mercury)
- metals: bronze and lead (but most of this is in fact a treatise on statuary)
- the uses of earth substances, beginning with pigments
(this is mostly a discussion of painters, although toward the end he gets back to sulphur)

The first half of this section has to do with stone sculpture;

then there is a bit on the architecture of obelisks, the Pyramids, and the Cretan labyrinth;

there is an analysis of the various building materials, such as plaster, sand, and stone;

finally there is a consideration of glass that leads into a paean to fire, with in the last paragraph an utterly peculiar story:

A WEEK: The true finish is the work of time, and the use to which a thing is put. The elements are still polishing the pyramids.

then there is more about stones (rock crystal, amber, gemstones and semi-precious stones):

Pliny. NATURAL HISTORY III.v.66-67: Romulus left the city of Rome, if we are to believe those who state the very greatest number, with only three gates, and no more. When the Vespasians were Emperors and Censors in the year of the building of the city, 826 [73 CE], the circumference of the walls which surrounded it was thirteen and two-fifths miles. Surrounding as it does the Seven Hills, the city is divided into fourteen districts, with 265 crossroads under the guardianship of the Lares [i.e., a little shrine to the Lares would stand at each crossing]. If a straight line is drawn from the mile column placed at the entrance of the Forum to each of the gates, which are at present thirty-seven in number –taking care to count only once the twelve double gates, and to omit the seven old ones, which no longer exist– the total result will be a straight line of twenty miles and 765 paces. But if we draw a straight line from the same mile column to the very last of the houses, including therein the Praetorian camp [in the suburbs] and follow throughout the line of the streets, the result will be something over seventy miles. Add to these calculations the height of the houses, and then a person may form a fair idea of this city, and surely he must confess that no other place in the world can vie with it in size.

On the eastern side it is bounded by the mound (agger) of Tarquinius Superbus – a work of surpassing grandeur; for he raised it so high as to be on a level with the walls on the side on which the city lay most exposed to attack from the neighboring plains. On all the other sides it has been fortified either with lofty walls, or steep and precipitous hills; yet it has come to pass, that the buildings of Rome –increasing and extending beyond all bounds– have now united many outlying towns to it.

Pliny. NATURAL HISTORY XXXVI.xxiv.101-110 (a rather free translation): In great buildings as well as in other things the rest of the world has been outdone by us Romans. If, indeed, all the buildings in our City are considered in the aggregate, and supposing them –so to say– all thrown together in one vast mass, the united grandeur of them would lead one to imagine that we



were describing another world, accumulated in a single spot. Not to mention among our great works the Circus Maximus, that was built by the Dictator Caesar –one stadium broad and three in length– and occupying with the adjacent buildings no less than four iugera [about 2 acres] with room for no less than 160,000 spectators seated – am I not, however, to include in the number of our magnificent structures the Basilica of Paulus with its admirable Phrygian columns [built also in [Julius Caesar's](#) day], the Forum of the late Emperor Augustus, the Temple of Peace erected by the Emperor Vespasian Augustus – some of the finest work the world has ever seen? [and many others].

We behold with admiration pyramids that were built by kings, while the very ground alone that was purchased by the Dictator Caesar, for the construction of his Forum, cost 100,000,000 sesterces. If, too, an enormous expenditure has its attractions for any one whose mind is influenced by money matters, be it known that the house in which Clodius [Cicero's enemy] dwelt was purchased by him at a price of 14,800,000 sesterces – a thing which I for my part look upon as no less astonishing than the monstrous follies that have been displayed by kings.

Frequently praise is given to the great sewer system of Rome. There are seven "rivers" made to flow, by artificial channels, beneath the city. Rushing onward like so many impetuous torrents, they are compelled to carry off and sweep away all the sewerage; and swollen as they are by the vast accession of the rain water, they reverberate against the sides and bottoms of their channels. Occasionally too the Tiber, overflowing, is thrown backward in its course, and discharges itself by these outlets. Obstinate is the struggle that ensues between the meeting tides, but so firm and solid is the masonry that it is able to offer an effectual resistance. Enormous as are the accumulations that are carried along above, the work of the channels never gives way. Houses falling spontaneously to ruins, or leveled with the ground by conflagrations are continually battering against them; now and then the ground is shaken by earthquakes, and yet –built as they were in the days of Tarquinius Priscus, seven hundred years ago– these constructions have survived, all but unharmed.

Passing to the dwellings of the city, in the consulship of Lepidus and Catulus [78 B.C.] we learn on good authority there was not in all Rome a finer house than that belonging to Lepidus himself, but yet –by Hercules!– within twenty-five years the very same house did not hold the hundredth rank simply in the City! Let anybody calculate –if he please– considering this fact, the vast masses of marble, the productions of painters, the regal treasures that must have been expended in bringing these hundred mansions to vie with one that in its day had been the most sumptuous and celebrated in all the City; and then let him reflect that, since then and down to the present, these houses had all of them been surpassed by others without number. There can be no doubt that the great fires are a punishment inflicted upon us for our luxury; but such are our habits, that in spite of such warnings, we cannot be made to understand that there are things in existence more perishable than even man himself.

[Pliny](#). NATURAL HISTORY XXXVI.xxiv.121-123: But let us now turn our



ASTRONOMY

ASTRONOMY

attention to some marvels that, if justly appreciated, may be pronounced to remain unsurpassed. Quintus Marcius Rex [praetor in 144 B.C.] upon being commanded by the Senate to repair the Appian Aqueduct and that of the Anio, constructed during his praetorship a new aqueduct that bore his name, and was brought hither by a channel pierced through the very sides of mountains. Agrippa, during his aedileship, united the Marcian and the Virgin Aqueducts and repaired and strengthened the channels of others. He also formed 700 wells, in addition to 500 fountains, and 130 reservoirs, many of them magnificently adorned. Upon these works too he erected 300 statues of marble or bronze, and 400 marble columns, and all this in the space of a single year! In the work which he has written in commemoration of his aedileship, he also informs us that public games were celebrated for the space of fifty-seven days and 170 gratuitous bathing places were opened to the public. The number of these at Rome has vastly increased since his time.

The preceding aqueducts, however, have all been surpassed by the costly work which has more recently been completed by the Emperors Gaius [[Caligula](#)] and [Claudius](#). Under these princes the Curtian and the Caerulean Waters with the "New Anio" were brought a distance of forty miles, and at so high a level that all the hills –whereon Rome is built– were supplied with water. The sum expended on these works was 350,000,000 sesterces. If we take into account the abundant supply of water to the public, for baths, ponds, canals, household purposes, gardens, places in the suburbs and country houses, and then reflect upon the distances that are traversed from the sources on the hills, the arches that have been constructed, the mountains pierced, the valleys leveled, we must perforce admit that there is nothing more worthy of our admiration throughout the whole universe.

79 CE

During this year [Koreans](#) recorded a [comet](#) in the east, moving into the north for twenty days. It is probably this comet to which the Emperor Titus Caesar Vespasian (ruled 79-81 CE), the eldest son of the Emperor Vespasian (who had ruled 69-79 CE) and "the conquer of Jerusalem" was referring, when he jested that "This hairy star is for the king of the Persians an omen."¹¹

SKY EVENT




































11. He was referring to the fact that he himself was balding while Persians typically wore their hair long.

141 CE

March 22: [Halley's Comet](#) whipped around the [sun](#). On its way back out into the dark of space where it would linger in the vicinity of the orbit of Pluto, it would pass by Earth at 0.17 astronomical units, and would appear quite bright.

SKY EVENT

The comet was looking down upon a planet Earth on which Claudius Ptolemy of Alexandria, in a study of refraction, including atmospheric refraction, that we have now retranslated from the Arabic in which his book was preserved, had recently suggested that the angle of refraction is proportional to the angle of incidence.

This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE,  1,057 BCE,  466 BCE,  391 BCE,  and 315 BCE,  but then on the 240 BCE  return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE  and again in 87 BCE,  and then it was recorded as being seen in 12 BCE,  66 CE,  141 CE,  218 CE,  295 CE,  374 CE,  451 CE,  530 CE,  607 CE,  684 CE,  760 CE (only by Chinese),  837 CE,  912 CE,  989 CE,  1066,  1145,  1222,  1301,  1378,  1456,  1531,  1607,  1682,  1758,  1835,  1910,  and 1986  - and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



HALLEY'S COMET



EDMOND HALLEY

March 27: There is a [Chinese](#) record of an observation of [Halley's Comet](#) on this date. The [comet](#) was said to be of a bluish white color and to be spanning about nine degrees.

ASTRONOMY

ASTRONOMY

ASTRONOMY

Late April: [Halley's Comet](#) was at its closest approach to Earth, and its tail was sweeping north across the three pairs of stars toward the south of the constellation of Ursa Major. No mention of this appearance of the [comet](#) has been located in Roman records.

ASTRONOMY

150 CE

circa 150 CE: Claudius Ptolemais (we refer to him as Ptolemy), the mapmaker at Alexandria, [astronomer](#): *TETRABIBLOS*. Ptolemy knew the earth was a sphere and inferred that only a third of the northern hemisphere of this sphere was habitable. During the following decade Ptolemy would be writing his *LIBER GEOGRAPHIA* (GEOGRAPHY), which would include, based on information collected by the legions in their travels, an atlas of the world known to Rome.



circa 150 CE: Marinus of Tyre wrote on Geodesy and Geography. “Marinus of Tyre, a Greek natural philosopher (scientist) who lived *circa* 150, may be properly called the founder of ancient mathematical geography. Apparently with greater success than Hipparchus (*circa* 150 BCE), he definitely located places by reference to two coordinates, namely [latitude](#) and [longitude](#), and his maps set a new standard which Ptolemy would recognize a little later. The maps themselves, however, have not come down to us. All we have are later visualizations:



He established the prime meridian through the *Fortunatae Insulae*, and this meridian would be adopted by Ptolemy. At a later time, the meridian was more definitely located through Ferro, one of the Canary Islands, and this position would be recognized until modern times.

178 CE

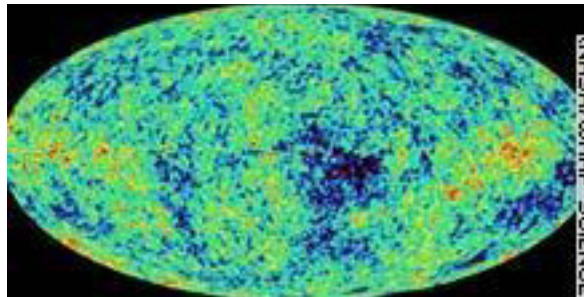
For 80 days there appeared in the skies above [China](#) a great [comet](#), the reddish tail of which spanned 70 to 70 degrees.

ASTRONOMY

185 CE

There are [Chinese](#) records of a nova in this year, a “guest star” in the constellation *Centaurus* which remained visible to the naked eye for some 20 months. Some suppose that this nova actually was a supernova, while others suppose that there was no supernova, but that instead we have confused together some records of the nova of this year with records of the visit of the comet Swift-Tuttle in 188 CE. It is of some importance to cosmologists whether the event of this year actually was a nova or actually was a supernova, because the data has been being used in some of their calculations of the age of the universe.


ASTRONOMY



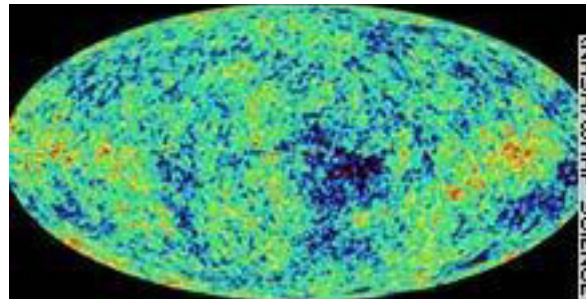
Comet Swift-Tuttle, not a small body at all, and with a potential impact speed of 60 kilometers per second, and with a generally intersecting trajectory, repeatedly whipping by us, has been described as the single most dangerous object known to humankind — somewhat more deadly even than your proverbial speeding bullet.

ASTRONOMY

188 CE

In this year P/Tempel-Tuttle was again sighted and duly recorded — although of course nobody as yet knew that this [comet](#) was a periodic one, the same one that had been sighted and duly recorded in 69 BCE, or that it would eventually receive the name Tempel-Tuttle.  (It is of some importance to cosmologists whether records of the comet of this year have been being mistakenly combined with records of a nova that had been observed in 185 CE, because the data has been being misused in some of their calculations of the age of the universe.)

ASTRONOMY



190 CE

Ts'ai Yung wrote on the Chinese calendar.

Chinese mathematicians used powers of 10 to express numbers.

In China, Liu Hui developed the method of approximation we know as Horner's Method — since a white man, W.G. Horner, would also discover this, in 1819, which would be, oh, let's see, very approximately some 65 generations of human life later. (Hey Horner dude, write and tell the people who are very approximately the great-grandchildren of Liu Hui about your wonderful new discovery!) By the use of polygons of up to 3,072 sides, Liu Hui was able to calculate π to the precision of five decimal places, as 3.14159.

191 CE

A white comet appeared over China and Korea, its tail stretching across 100 degrees of the sky.

SKY EVENT

218 CE

May 17: [Halley's Comet](#) whipped around the [sun](#). This visit to our solar system would be recorded.

SKY EVENT

This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, [→](#) 1,057 BCE, [→](#) 466 BCE, [→](#) 391 BCE, [→](#) and 315 BCE, [→](#) but then on the 240 BCE [→](#) return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE [→](#) and again in 87 BCE, [→](#) and then it was recorded as being seen in 12 BCE, [→](#) 66 CE, [→](#) 141 CE, [→](#) 218 CE, [→](#) 295 CE, [→](#) 374 CE, [→](#) 451 CE, [→](#) 530 CE, [→](#) 607 CE, [→](#) 684 CE, [→](#) 760 CE (only by Chinese), [→](#) 837 CE, [→](#) 912 CE, [→](#) 989 CE, [→](#) 1066, [→](#) 1145, [→](#) 1222, [→](#) 1301, [→](#) 1378, [→](#) 1456, [→](#) 1531, [→](#) 1607, [→](#) 1682, [→](#) 1758, [→](#) 1835, [→](#) 1910, [→](#) and 1986 [→](#) - and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



HALLEY'S COMET



EDMOND HALLEY

240 CE

In this year a [comet](#) was recorded in [China](#). It was visible for 40 days.

ASTRONOMY

November 10: The first sighting of the [comet](#) of this year, in [China](#). At this point it measured 30 degrees and was in Scorpio, heading toward Sagittarius.

ASTRONOMY



ASTRONOMY

ASTRONOMY

December 19: The [comet](#) of this year, after having “trespassed” against [Venus](#), on this night was “trespassing” against Aquarius. At this point it was making its closest approach to the earth, approximately one astronomical unit.

[ASTRONOMY](#)

250 CE

In [Japan](#), the Shinto shrine of Ise was originated.

At about this point, in [China](#), Siu Yo wrote a book on arithmetic and Hsu Yueh was preparing a commentary on Siu Yo’s work.

ASTRONOMY

ASTRONOMY

We're not even sure in what century Diophantus of Alexandria lived in, but by convention we assign some date like this to his putting out the 1st Western treatise on [algebra](#) and the theory of numbers, his *ARITHMETICA*, of which a few of the books have survived. Many of the problems involve solutions in integers only (Diophantine equations). When he obtained negative numbers as solutions to some of his equations, he dismissed them as "absurd."

DIOPHANTI
ALEXANDRINI
ARITHMETICORVM
LIBRI SEX,
ET DE NVMERIS MVLTANGVLIS
LIBER VNVS.

CVM COMMENTARIIS C. G. BACHETI P. C.
& obseruationibus D. P. de FERMAT Senatoris Tulosani.

Accessit Doctrinae Analyticae inuentum nouum, collectum
ex varijs eiusdem D. de FERMAT Epistolis.



TOLOSE,
Excudebat BERNARDVS BOSCH, à Regione Collegij Societatis Iesu.
M. DC. LXX. M.

262 CE

262 CE: We haven't been able to figure out from the inscription, whether a [comet](#) seen in this year from the Orient had a tail that was less than one degree long, or a tail that was 50 degrees long. However, it was recorded to be visible for a period of 45 nights.

SKY EVENT



ASTRONOMY

ASTRONOMY

265 CE

Making use of a rule-of-thumb approximation to pi, $\pi = 142/45$, Wang Fan wrote on [astronomy](#).

CHINA

280 CE

Anatolius wrote on [astronomy](#).

287 CE

A [comet](#) seen in this year from the Orient had a 100-degree tail, but was visible in Sagittarius for only ten days.

SKY EVENT

CHINA

295 CE

April 20: [Halley's Comet](#) whipped around the [sun](#). On this visit to our solar system it would be recorded by the [Chinese](#) but not by the Romans.

SKY EVENT



HALLEY'S COMET



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EDMOND HALLEY

300 CE

The Mayans were in the process of creating their day-count [calendar](#), which combined the 52-year-cycle of the 365-day Olmec calendar with the 260-day “tzolkin” cycle (13 cycles of 20 days each). They were dating events back as far as 3,000 BCE.

[Chinese](#) development of the abacus may have been already underway at this point, although the 1st preserved printed reference would not occur until 1593 CE.

From this year until 309 CE, the [astronomer](#) Chen Zhuo of [China](#) would be making a single star map by combining the 4th Century BCE star maps of Shih Shen, of Gan De, and of Wu Xien.



ASTRONOMY

ASTRONOMY

302 CE

May or June: Possible translations of [Chinese](#) and [Korean](#) records are “A broom star appeared in the day” or “A broom star was visible in the morning.” It is difficult to determine whether what was being recorded was that the [comet](#) was so bright that it could be seen during the daylight, or that the comet appeared in the pre-dawn sky.

SKY EVENT

ASTRONOMY

ASTRONOMY

312 CE

October 28: Our favorite pushy people, the [Romans](#), met at Augusta Taurinorum in northern [Italy](#) some even pushier people, to wit the legions of [Constantine the Great](#) — and the outcome of this would be [an entirely new Pax Romana](#). While about to do battle against the legions of Maxentius which outnumbered his own 4 to 1, Constantine had a vision in which he saw a compound symbol ☩ (*chi* Χχ and *rho* Ρρ, the beginning of Χρῆστος) appearing in the cloudy heavens,¹² and heard “Under this sign you will be victorious.” He placed the symbol on his helmet and on the shields of his soldiers, and Maxentius’s horse threw him into the water at Milvan (Mulvian) Bridge and the Roman commander was drowned (what more could one ask God for?).



12. In a timeframe in which no real distinction was being made between astrology and astronomy, you will note, seeing a sign like this in the heavens may be classed as astronomy quite as readily as it may be classed as astrology. Also, in a timeframe in which no real distinction was being made between God being on your side and you being on God’s side, having this sort of belief system may be classed as theology quite as readily as it may be classed as superstition.

According to an account written by an Orthodox bishop named Eusebius during the 330s, the Eastern Roman Caesar Constantinus I converted to Christianity, his goal being to obtain magical power over his enemies. However, this account by Eusebius is of questionable veracity. The cross he describes sounds more like a Mithraic labarum than a Christian cross. Also, Constantinus did not ever convert the Roman Empire to Christianity but instead merely ended its persecution of heterodox religious cults. Subsequent churchly agitprop notwithstanding, Constantinus would not become a Christian before his deathbed in 337 — and then his conversion would be to Arian or Alexandrian Christianity rather than to what we would regard as orthodox Roman Catholicism.

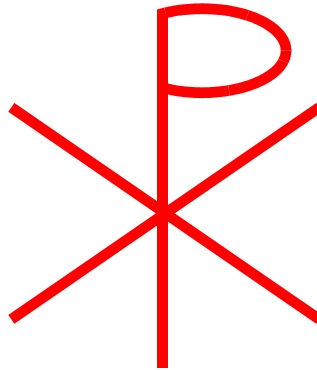
ASTRONOMY

ASTRONOMY



"History teaches us that religion and patriotism have always gone hand in hand."

— General Douglas MacArthur



Thus began nominal Christianity, something that has been with us ever since. The back of this coin depicts two soldiers beside their standard — which utilizes the battle symbol in question.



Constantine, who had been born a bastard, would be able to enter Rome in triumph as the new Emperor. Sylvester I, who would be the Papa of Rome from 314 CE to 335 CE, would have no difficulty with the concept of a warrior coming to the Christian faith by slaughtering his enemies. So was to begin the fatal alliance between Caesar and Papa. Throne and Altar would become part of the orthodoxy of the Roman church establishment. As Emperor, Constantine would retain his other title, Pontifex Maximus, which is to say, head of the pagan state cult. However, confident that his victory at the bridge meant the Christian God was on his side, in Milan in the following year he would proclaim religious tolerance for everyone without distinction, thereby allowing the Christian Church and the Jewish Church to come out of the gloom of the catacombs into the full light of day. The tragedy is that this fundamental principle of religious tolerance would not be accepted by the Roman Catholic Church until the late 20th Century. He would opinion that even he himself had become something of a Christian (although this wouldn't prevent him from offing his second wife). Constantine allegedly would be baptized by a heretical Arian Papas named Eusebius just prior to his death. He saw the church merely as an instrument of political and cultural cohesion, a pillar of the Imperial structure he was building. The Emperor's actions represent the Roman obsession with order rather than any religious conviction. He would call the first Ecumenical Council in 325. He established the idea of a council of all Christian communities as the only way to formulate the faith incontestably and forever. It would be he who

would order that the Roman citizen Paul's letters and other manuscripts be compiled together into one book. It is noteworthy that some have considered this man to be "the thirtieth Apostle."

The coinage of the subsequent emperors would increasingly rely on this symbolism that had been pioneered by Constantine, and elaborate on it with **IN HOC SIGNO VINCES** — in the same devout spirit as during our civil war Secretary of the Treasury Salmon Portland Chase would order that we engrave **In God We Trust** on our sacred gold half-eagle, eagle, and double-eagle coins, and on our sacred silver dollar, half-dollar, and quarter-dollar, and on our sacred nickel five-cent piece.¹³ (No one whose opinion matters ever considers this sort of thing to be an act of cynicism — with the signal exception of President Theodore Roosevelt, whose opinion in the matter we have utterly ignored!)



"No matter how cynical you get,
it is impossible to keep up."
— Lily Tomlin



During this year at some point, the founder of the Exegetical School in Antioch, Lucian, who had revised the LXX, would be martyred.

321 CE

The Emperor [Constantine](#) decreed that the day of the [sun](#) was going to be the official Roman-Christian day of rest. (The sun was big, the sun was powerful, his Roman Empire was big, his Roman Empire was powerful ... this Constantine guy, you see, wasn't up to making much of a distinction between worshipping the Sun-God and worshipping the Son of God: "I'm the Decider!")

336 CE

February: There are records of a "broom star" that appeared in the western sky, in the constellation of Andromeda. Later it would be recorded, in the West, that a "hairy star of unusual size" had presaged the May 337 death of the Emperor [Constantine](#), and it is likely that this Occidental "hairy star" was in fact this Oriental "broom star."

ASTRONOMY

CHINA

COMET

December 25: The 1st recorded celebration of [Christmas](#) as a Christian holy day took place on this day¹⁴ in Rome. (The birthday of the [Sun](#)-God was becoming the birthday of the Son of God, for in previous years, this had been the celebration of *Natalis Solis Invicti*, favorite of Roman legionnaires.)

13. Such bumper-sticker philosophy won't fit on our dime or penny coins, because they are too small to hold so many words.

14. In this timeframe the winter solstice was happening on December 25th. By our own century, the winter solstice has drifted to the point on which it is now happening instead on December 21st — but as you've noticed, this is now and that was then.



ASTRONOMY

ASTRONOMY

338 CE

The Jewish [lunar calendar](#) was modified with different year lengths, to correct to the [solar](#) calendar.

364 CE

June 16: An [eclipse](#) of the [sun](#) was viewed by Theon.

SKY EVENT

374 CE

February 16: [Halley's Comet](#) whipped around the [sun](#). On this visit this [comet](#) should have been very impressive, since on its dive toward Sol it had passed Earth at only 0.09 astronomical units and for about a week may have outshone the brightest star in the sky. However, it had passed just in advance of the path of Earth and therefore would have been visible only in the morning sky, where it would have needed to be distinguished from the background brightness — at any rate, there seems to be no European record of its sighting this time.

SKY EVENT



HALLEY'S COMET



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EDMOND HALLEY

386 CE

The explosion of a massive star was noted by the Chinese as a brilliant new point of light in the constellation that Westerners refer to as Sagittarius. Early in the year 2001, astronomers using the Earth-orbiting Chandra X-Ray Observatory revealed that they had discovered that this explosion in 386 CE had created the sort of extremely dense object known as a pulsar, about 15,000 light years away from us, spinning at the rate of 14 times per second and emitting flashes of X-radiation “like an overcharged lighthouse beacon.” (Before this announcement we had known of only one such object, the pulsar in the Crab Nebula, spinning at about 30 times a second, that originated in a supernova of July 4, 1054 CE that was some 7,000 light years away and also had been observed by Chinese astronomers.)

ASTRONOMY



ASTRONOMY

ASTRONOMY

390 CE

August 7: A [comet](#) which appeared on this night in the constellation of Gemini would be observed for thirty days in [China](#), in [Korea](#), and in [Rome](#).

SKY EVENT

August 18: The [comet](#) on this day passed within a tenth of an astronomical unit of Earth.

SKY EVENT

September 5: The [comet](#) on this day was at perihelion, whipping around the sun at 0.92 astronomical units.

SKY EVENT

September 8: Entering the northern part of the constellation of Ursa Major, the tail of the [comet](#) was white and was over 100 degrees long.

SKY EVENT

September 18: The [comet](#) disappeared over the northern horizon of temperate-land observers.

SKY EVENT

400 CE

February 25: A [comet](#) passed behind the sun, only 0.21 astronomical units above its surface. It had not yet been noticed from Earth.

SKY EVENT

March 19: This was the [comet](#)'s point of maximum brightness outside of twilight, as it sped back out from behind the sun in the direction of Earth. At first sighting it was in the morning sky between the constellations of Andromeda and Pisces, with its 45-degree tail extending into the constellation of Cassiopeia. Its apparent motion was toward the constellation of Ursa Major.

SKY EVENT

March 31: The perigee of the [comet](#). This was a very close miss, as the comet passed us by with a mere 0.08 astronomical units gap. We have reports on this comet from [China](#), from [Korea](#), and from [Rome](#). It was described as sword-like.

SKY EVENT

April 10-May 9: As the current [comet](#) soared away from the orbit of Earth out into the silent cold dark, its apparent motion was into the constellation of Leo in our evening sky.

SKY EVENT



ASTRONOMY

ASTRONOMY

418 CE

June 24: We don't know whether there were one or two or three comets during this year. The first sighting of a [comet](#) occurred in [China](#) on this date, a "bushy star" appearing in the constellation of Ursa Major.

SKY EVENT

July 19: Romans mentioned seeing a [comet](#), or something comet-like, during an eclipse of the sun that may or may not have been total. Roman sources also mentioned a comet that was visible during the entire period from midsummer into autumn.

SKY EVENT

September 15: [Chinese](#) records indicate a [comet](#) from this point forward, in the constellation of Leo, with "rays" extending more than 100 degrees toward the north, reaching the constellation of Ursa Major.

SKY EVENT

442 CE

November 10: A [comet](#) was reported, that would be visible for more than 100 days. Its apparent path across the constellations would take it from Ursa Major into Auriga, then Taurus, then Eridanus.

SKY EVENT

December 7: The 100-day [comet](#) was at this point closest to earth, at 0.58 astronomical units, and diving toward the sun.

SKY EVENT

December 15: The 100-day [comet](#) passed around the sun and was on its way back out.

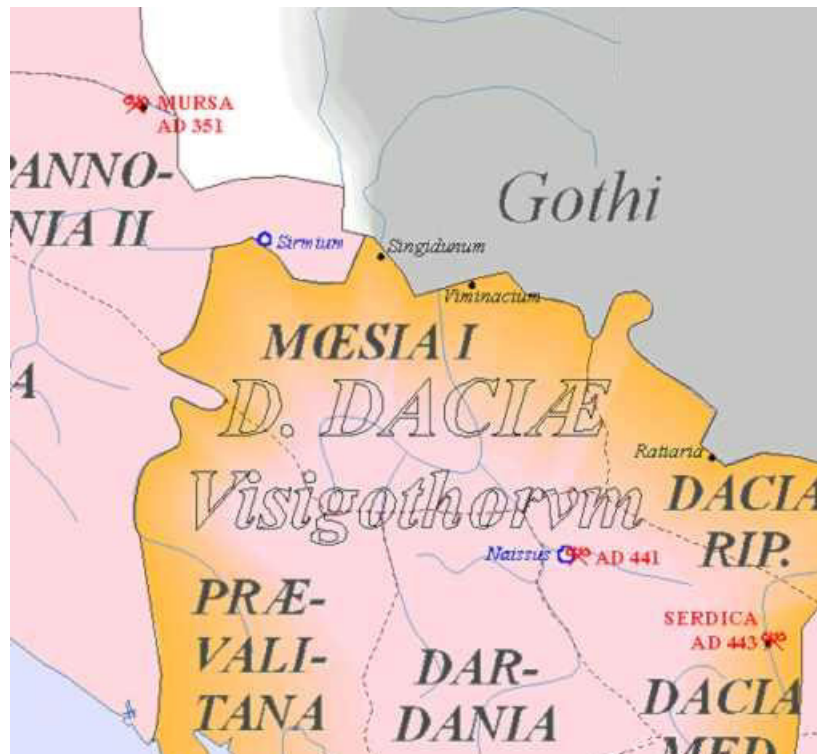
SKY EVENT

443 CE

During this year there were plenty of Eta Aquarid meteors plunging into our atmosphere, Eta Aquarid being a Halley-derived swarm associated with the outbound portion of the looping trajectory of [Halley's Comet](#). We don't have any real estimate of with what frequency these meteors were appearing, but they must have been frequent. During this 5th Century, at Carthage, little children were being sacrificed to Baal, and we do have an estimate of the frequency with which such sacrifices were being rendered, for, according to the calculations of one archeologist, they were being sacrificed at a rate of "slightly fewer than one every three days." A hollow metal idol would be heated, and the child would be dropped into its mouth — this proved something or other, especially when the child was a firstborn.

SKY EVENT

A bunch of grownup men attacked and tried to kill off each other, at Serdica. This also proved something or other:



446 CE

During this year there were plenty of Eta Aquarid meteors plunging into our atmosphere, Eta Aquarid being a Halley-derived swarm associated with the outbound portion of the looping trajectory of [Halley's Comet](#).

SKY EVENT

446 The Britons, now left to themselves, are greatly harassed by the Scots and Picts, upon which they once more make their complaint to the Romans, but receive no assistance from that quarter.

447 Attila (surnamed the Scourge of God) with his Huns, ravages the Roman empire.

449 Vortigern, king of the Britons, invites the Saxons into Britain against the Scots and Picts.

455 The Saxons having repulsed the Scots and Picts, invite over more of their countrymen, and begin to establish themselves in Kent, under Hengist.

476 The western empire is finished, 523 years after the battle of Pharsalia; upon the ruins of which several new states arise in Italy and other parts, consisting of Goths, Vandals, Huns, and other Barbarians, under whom literature is extinguished, and the works of the learned are destroyed.

496 Clovis, king of France, baptized, and Christianity begins in that kingdom.

508 Prince Arthur begins his reign over the Britons.

516 The computing of time by the Christian æra is introduced by Dionysius the monk.

529 The code of Justinian, the eastern emperor, is published.

581 Latin ceased to be spoken about this time in Italy.

596 Augustine the monk comes into England with forty monks.

606 Here begins the power of the popes, by the concessions of Phocas, emperor of the east.

622 Mahomet, the false prophet, flies from Mecca to Medina, in Arabia, in the 44th year of his age, and 10th of his ministry, when he laid the foundation of the Saracen empire; and from whom the Mahometan princes to this day claim their descent. His followers compute their time from this æra, which in Arabic is called Hegira, i. e. the Flight.

637 Jerusalem is taken by the Saracens, or followers of Mahomet.

451 CE

June 28: [Halley's Comet](#) whipped around the sun, this time appearing brightly first in the morning and then, in a few days on its closest approach, on its way back out toward the orbit of Pluto, in the evening sky. Attila the Hun was suffering his first serious reverses. (When this leader would die of a drunken nosebleed in 453 CE, it would be a different [comet](#) that would be in the sky.)

ASTRONOMY



HALLEY'S COMET



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EDMOND HALLEY



ASTRONOMY

ASTRONOMY



"Brilliant generalship in itself is a frightening thing – the very idea that the thought processes of a single brain of a Hannibal or a Scipio can play themselves out in the destruction of thousands of young men in an afternoon."

– Victor Davis Hanson, *CARNAGE AND CULTURE: LANDMARK BATTLES IN THE RISE OF WESTERN POWER* (NY: Doubleday, 2001)





"The discomfiture of the mighty attempt of Attila to found a new Anti-Christian dynasty upon the wreck of the temporal power of Rome, at the end of the term of twelve hundred years, to which its duration had been limited by the forebodings of the heathen."—Herbert.

A broad expanse of plains, the Campi Catalaunici of the ancients, spreads far and wide around the city of Chalons, in the north-east of France. The long rows of poplars, through which the river Marne winds its way, and a few thinly-scattered villages, are almost the only objects that vary the monotonous aspect of the greater part of this region. But about five miles from Chalons, near the little hamlets of Chape and Cuperly, the ground is indented and heaped up in ranges of grassy mounds and trenches, which attest the work of man's hand in ages past; and which, to the practiced eye, demonstrate that this quiet spot has once been the fortified position of a huge military host. Local tradition gives to these ancient earth-works the name of Attila's Camp. Nor is there any reason to question the correctness of the title, or to doubt that behind these very ramparts it was that, 1400 years ago, the most powerful heathen king that ever ruled in Europe, mustered the remnants of his vast army, which had striven on these plains against the Christian soldiery of Toulouse and Rome. Here it was that Attila prepared to resist to the death his victors in the field; and here he heaped up the treasures of his camp in one vast pile, which was to be his funeral pyre should his camp be stormed. It was here that the Gothic and Italian forces watched, but dared not assail, their enemy in his despair, after that great and terrible day of battle, when

"The sound
Of conflict was o'erpast, the shout of all
Whom earth could send from her remotest bounds,
Heathen or faithful; from thy hundred mouths,
That feed the Caspian with Riphean snows,
Huge Volga! from famed Hypanis, which once
Cradled the Hun; from all the countless realms
Between Imaus and that utmost strand
Where columns of Herculean rock confront
The blown Atlantic; Roman, Goth, and Hun,
And Scythian strength of chivalry, that tread
The cold Codanian shore, or what far lands
Inhospitable drink Cimmerian floods,
Franks, Saxons, Suevic, and Sarmatian chiefs,
And who from green Armorica, or Spain
Flocked to the work of death."

The victory which the Roman general Aetius, with his Gothic allies, had then gained over the Huns, was the last victory of Imperial Rome. But among the long Fasti of her triumphs, few can be found that, for their importance and ultimate benefit to mankind, are comparable with this expiring effort of her arms. It did not, indeed, open to her any new career of conquest—it did not consolidate the relics of her power—it did not turn the rapid ebb of her fortunes. The mission of Imperial Rome was, in truth, already accomplished. She: had received and transmitted through her once ample dominion the civilization of Greece. She



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had broken up the barriers of narrow nationalities among the various states and tribes that dwelt around the coasts of the Mediterranean. She had fused these and many other races into one organized empire, bound together by a community of laws, of government, and institutions. Under the shelter of her full power the True Faith had arisen in the earth, and during the years of her decline it had been nourished to maturity, and had overspread all the provinces that ever obeyed her sway. For no beneficial purpose to mankind could the dominion of the seven-hilled city have been restored or prolonged. But it was all-important to mankind what nations should divide among them Rome's rich inheritance of empire:—whether the Germanic and Gothic warriors should form states and kingdoms out of the fragments of her dominions, and become the free members of the commonwealth of Christian Europe; or whether pagan savages from the wilds of Central Asia should crush the relics of classic civilization, and the early institutions of the Christianized Germans, in one hopeless chaos of barbaric conquest. The Christian Visigoths of king Theodoric fought and triumphed at Chalons, side by side with the: legions of Aetius. Their joint victory over the Hunnish host not only rescued for a time from destruction the old age of Rome, but preserved for centuries of power and glory the Germanic element in the civilization of modern Europe.

In order to estimate the full importance to mankind of the battle of Chalons, we must keep steadily in mind who and what the Germans were, and the important distinctions between them and the numerous other races that assailed the Roman Empire: and it is to be understood that the Gothic and Scandinavian nations are included in the German race. Now, "in two remarkable traits the Germans differed from the Sarmatic, as well as from the Slavic nations, and, indeed, from all those other races to whom the Greeks and Romans gave the designation of barbarians. I allude to their personal freedom and regards for the rights of men; secondly, to the respect paid by them to the female sex, and the chastity for which the latter were celebrated among the people of the North. These were the foundations of that probity of character, self-respect, and purity of manners which may be traced among the Germans and Goths during pagan times, and which, when their sentiments were enlightened by Christianity, brought out those splendid traits character which distinguish the age of chivalry and romance." What the intermixture of the German stock with the classic, at the fall of the Western Empire, has done for mankind, may be best felt by watching, with Arnold, over how large a portion of the earth the influence of the German element is now extended.

"It affects, more or less, the whole west of Europe from the head of the Gulf of Bothnia to the most southern promontory of Sicily, from the Oder and the Adriatic to the Hebrides and to Lisbon. It is true that the language spoken over a large portion of this space is not predominantly German; but even in France and Italy and Spain, the influence of the Franks, Burgundians, Visigoths, Ostrogoths, and Lombards, while it has colored even the language, has in blood and institutions left its mark legibly and indelibly. Germany, the Low Countries, Switzerland for the most part, Denmark, Norway, and Sweden, and our own



islands, are all in language, in blood, and in institutions, German most decidedly. But all South America is peopled with Spaniards and Portuguese; all North America, and all Australia, with Englishmen. I say nothing of the prospects and influence of the German race in Africa and in India: it is enough to say that half of Europe, and all America and Australia, are German, more or less completely, in race, in language, or in institutions, or in all."

By the middle of the fifth century, Germanic nations had settled themselves in many of the fairest regions of the Roman empire, had imposed their yoke on the provincials, and had undergone, to a considerable extent, that moral conquest which the arts and refinements of the vanquished in arms have so often achieved over the rough victor. The Visigoths held the north of Spain and Gaul south of the Loire. Franks, Alemanni, Alans, and Burgundians, had established themselves in other Gallic provinces, and the Suevi were masters of a large southern portion of the Spanish peninsula. A king of the Vandals reigned in North Africa, and the Ostrogoths had firmly planted themselves in the provinces north of Italy. Of these powers and principalities, that of the Visigoths, under their king Theodoric, son of Alaric, was by far the first in power and in civilization.

The pressure of the Huns upon Europe had first been felt in the fourth century of our era. They had long been formidable to the Chinese empire; but the ascendancy in arms which another nomadic tribe of Central Asia, the Sienpi, gained over them, drove the Huns front their Chinese conquests westward; and this movement once being communicated to the whole chain of barbaric nations that dwelt northward of the Black Sea and the Roman empire, tribe after tribe of savage warriors broke in upon the barriers of civilized Europe, "velut unda supervenit undam." The Huns crossed the Tanais into Europe in 375, and rapidly reduced to subjection the Alans, the Ostrogoths, and other tribes that were then dwelling along the course of the Danube. The armies of the Roman emperor that tried to check their progress, were cut to pieces by them; and Pannonia and other provinces south of the Danube were speedily occupied by the victorious cavalry of these new invaders. Not merely the degenerate Romans, but the bold and hardy warriors of Germany and Scandinavia were appalled at the numbers, the ferocity, the ghastly appearance, and the lightning-like rapidity of the Huns. Strange and loathsome legends were coined and credited, which attributed their origin to the union of

"Secret, black, and midnight hags"

with the evil spirits of the wilderness.

Tribe after tribe, and city after city, fell before them. Then came a pause in their career of conquest in southwestern Europe, caused probably by dissension's among their chiefs, and also by their arms being employed in attacks upon the Scandinavian nations. But when Attila (or Atzel, as he is called in the Hungarian language) became their ruler, the torrent of their arms was directed with augmented terrors upon the west and the south; and their myriad's marched beneath the guidance of one master-mind to the overthrow both of the new and the old powers



of the earth.

Recent events have thrown such a strong interest over everything connected with the Hungarian name, that even the terrible name of Attila now impresses us the more vividly through our sympathizing admiration of the exploits of those who claim to be descended from his warriors, and "ambitiously insert the name of Attila among their native kings." The authenticity of this martial genealogy is denied by some writers, and questioned by more. But it is at least certain that the Magyars of Arpad, who are the immediate ancestors of the bulk of the modern Hungarians, and who conquered the country which bears the name of Hungary in AD 889, were of the same stock of mankind as were the Huns of Attila, even if they did not belong to the same subdivision of that stock. Nor is there any improbability in the tradition, that after Attila's death many of his warriors remained in Hungary, and that their descendants afterwards joined the Huns of Arpad in their career of conquest. It is certain that Attila made Hungary the seat of his empire. It seems also susceptible of clear proof that the territory was then called Hungvar, and Attila's soldiers Hungvari. Both the Huns of Attila and those of Arpad came from the family of nomadic nations, whose primitive regions were those vast wildernesses of High Asia, which are included between the Altaic and the Himalayan mountain-chains, The inroads of these tribes upon the lower regions of Asia, and into Europe, have caused many of the most remarkable revolutions in the history of the world. There is every reason to believe that swarms of these nations made their way into distant parts of the earth, at periods long before the date of the Scythian invasion of Asia, which is the earliest inroad of the nomadic race that history records. The first, as far as we can conjecture, in respect to the time of their descent, were the Finnish and Ugrian tribes, who appear to have come down from the Altaic border of High Asia towards the north-west, in which direction they advanced to the Uralian mountains. There they established themselves: and that mountain chain, with its valleys and pasture lands, became to them a new country, whence they sent out colonies on every side; but the Ugrian colony, which, under Arpad, occupied Hungary, and became the ancestors of the bulk of the present Hungarian nation, did not quit their settlements on the Uralian mountains till a very late period, not until four centuries after the time when Attila led from the primary seats of the nomadic races in High Asia the host with which he advanced into the heart of France. That host was Turkish; but closely allied in origin, language, and habits, with the Finno-Ugrian settlers on the Ural.

Attila's fame has not come down to us through the Partial and suspicious medium of chroniclers and poets of his own race. It is not from Hunnish authorities that we learn the extent of his might: it is from his enemies, from the literature and the legends of the nations whom he afflicted with his arms, that we draw the unquestionable evidence of his greatness. Besides the express narratives of Byzantine, Latin, and Gothic writers, we have the strongest proof of the stern reality of Attila's conquests, in the extent to which he and his Huns have been the themes of the earliest German and Scandinavian lays. Wild as many of these legends are, they bear concurrent and certain



testimony to the awe, with which the memory of Attila was regarded by the bold warriors who composed and delighted in them. Attila's exploits, and the wonders of his unearthly steed and magic sword, repeatedly occur in the Sagas of Norway and Iceland; and the celebrated Niebelungen Lied, the most ancient of Germanic poetry, is full of them. There Etzel, or Attila, is described as the wearer of twelve mighty crowns, and as promising to his bride the lands of thirty kings, whom his irresistible sword had subdued. He is, in fact, the hero of the latter part of this remarkable poem and it is at his capital city, Etzelenburgh, which evidently corresponds to the modern Buda that much of its action takes place.

When we turn from the legendary to the historic Attila, we see clearly that he was not one of the vulgar herd of barbaric conquerors. Consummate military skill may be traced in his campaigns; and he relied far less on the brute force of armies for the aggrandizement of his empire, than on the unbounded influence over the affections of friends and the fears of foes, which his genius enabled him to acquire. Austerely sober in his private life,—severely just on the judgment-seat,—conspicuous among a nation of warriors for hardihood, strength, and skill in every martial exercise,—grave and deliberate in counsel, but rapid and remorseless in execution,—he gave safety and security to all who were under his dominion, while he waged a warfare of extermination against all who opposed or sought to escape from it. He watched the national passions, the prejudices, the creeds, and the superstitions of the, varied nations over which he ruled, and of those which he sought to reduce beneath his sway: all these feelings he had the skill to turn to his own account. His own warriors believed him to be the inspired favorite of their deities, and followed him with fanatic zeal: his enemies looked on him with horror; as the pre-appointed minister of Heaven's wrath against themselves; and, though they believed not in his creed, their own made them tremble before him.

In one of his early campaigns, he appeared before his troops with an ancient iron sword in his grasp, which he told them was the god of war whom their ancestors had worshipped. It is certain that the nomadic tribes of Northern Asia, whom [Herodotus](#) described under the name of Scythians, from the earliest times worshipped as their god a bare sword. That sword-god was supposed, in Attila's time, to have disappeared from earth; but the Hunnish king now claimed to have received it by special revelation. It was said that a herdsman who was tracking in the desert a wounded heifer by the drops of blood, found the mysterious sword standing fixed in the ground, as if it had been darted down from heaven. The herdsman bore it to Attila, who thenceforth was believed by the Huns to wield the Spirit of Death in battle; and the seers prophesied that that sword was to destroy the world. The Roman, Priscus, who was on an embassy to the Hunnish camp recorded in his memoirs Attila's acquisition of this supernatural weapon and the immense influence over the minds of the barbaric tribes which its possession gave him. In the title which he assumed, we shall see the skill with which he availed himself of the legends and creeds of other nations as well as of his own. He designated himself "Attila Descendant of the Great Nimrod Nurtured in Engaddi. By the Grace of God,



King of the Huns, the Goths, the Danes, and the Medes. The Dread of the World."

Herbert states that Attila is represented on old medallion with a Teraphim or a head, on his breast; and the same writer adds: "We know, from the 'Hamartigenca' of Prudentius, that: Nimrod, with a snaky-haired head, was the object of adoration to the heretical followers of Marcion; and the same head was the palladium set up by Antiochus Epiphanes over the gates of Antioch, though it has been called the visage of Charon. The memory of Nimrod was certainly regarded with mystic veneration by many; and by asserting himself to be the heir of that mighty hunter before the Lord, he vindicated to himself at least the whole Babylonian kingdom.

"The singular assertion in his style, that he was nurtured in Engaddi, where he certainly had never been, will be more easily understood on reference to the twelfth chapter of the book of Revelations, concerning the woman clothed with the sun, who was to bring forth in the wilderness - 'where she hath a place prepared of God'-a man-child who was to contend with the dragon having seven heads and ten horns, and rule all nations with a rod of Iron. This prophecy was at that time understood universally by the sincere Christians to refer to the birth of Constantine, who was to overwhelm the paganism of the city on the seven hills, and it is still so explained; but it is evident that the heathens must have looked on it in a different light, and have regarded it as a foretelling of the birth of that Great One who should master the temporal power of Rome. The assertion, therefore, that he was nurtured in Engaddi is a claim to be looked upon as that man-child who was to be brought forth in a place prepared of God in the wilderness. Engaddi means a place palms and vines in the desert; it was hard by Zoar, the city of refuge which was saved ill the vale of Siddim or Demons when the rest were destroyed by fire and brimstone from the Lord in heaven and might therefore, be especially called a place prepared of God in the wilderness."

It is obvious enough why he styled himself "By the Grace of God, King of the Huns and Goths; "and it seems far from difficult to see why he added the names of the Medes and the Danes. His armies had been engaged in warfare against the Persian kingdom of the Sassanidae and it is certain [See the narrative of Priscus.] that he meditated the attack and overthrow of the Medo-Persian power. Probably some of the northern provinces of that kingdom had been compelled to pay him tribute; and this would account for his styling himself King of the Medes, they being his remotest subjects to the south. From a similar cause he may have called himself King Of the Danes, as his power may well have extended northwards as far as the nearest of the Scandinavian nations; and this mention of Medes and Danes as his subjects, would serve at once to indicate the vast extent of his dominion. [In the "Niebelungen-Lied." the old poet who describes the reception of the heroine Chrimhild by Attila [Etsel], says that Attila's dominions were so vast that among his subject-warriors there were Russian Greek Wallachian Polish and even Danish knights.]

The extensive territory north of the Danube and Black Sea, and eastward of Caucasus, over which Attila ruled first in



conjunction with his brother Bleda, and afterwards alone cannot be very accurately defined; but it must have comprised within it, besides the Huns, many nations of Slavic, Gothic, Teutonic, and Finnish origin. South also of the Danube the country from the river Sau as far as Novi in Thrace, was a Hunnish province. Such was the empire of the Huns in AD 443; a memorable year, in which Attila founded Buda on the Danube his capital city; and ridded himself of his brother a crime, which seems to have been prompted not only by selfish ambition, but also by a desire of turning to his purpose the legends and forebodings, which then were universally spread throughout the Roman Empire, and must have been well known to the watchful and ruthless Hun.

The year 445 of our era completed the twelfth century from the foundation of Rome, according to the best chronologers. It had always been believed among the Romans, that the twelve vultures, which were said to have appeared to Romulus when he founded the city, signified the time during which the Roman power should endure. The twelve vultures denoted twelve centuries. This interpretation of the vision of the birds of destiny was current among learned Romans even when there were yet many of the twelve centuries to run, and while the imperial city was at the zenith of its power. But as the allotted time drew nearer and nearer to its conclusion, and as Rome grew weaker and weaker beneath the blows of barbaric invaders, the terrible omen was more and more talked and thought of; and in Attila's time men watched for the momentary extinction of the Roman State with the last beat of the last vulture's wing. Moreover, among the numerous legends connected with the foundation of the city, and the fratricidal death of Remus there was one most terrible one, which told that Romulus did not put his brother to death in accident, or in hasty quarrel, but that

"He slew his gallant twin
With inexpiable sin,"

deliberately, and in compliance with the warnings of supernatural powers. The shedding of a brother's blood was believed to have been the price, at which the founder of Rome had purchased from destiny her twelve centuries of existence. We may imagine, therefore, with what terror in this, the twelve-hundredth year after the foundation of Rome, the inhabitants of the Roman Empire must have heard the tidings, that the royal brethren, Attila and Bleda had founded a new capitol on the Danube, which was designed to rule over the ancient capitol on the Tiber; and that Attila, like Romulus had consecrated the foundations of his new city by murdering his brother; so that for the new cycle of centuries then about to commence, dominion had been bought from the gloomy spirits of destiny in favor of the Hun, by a sacrifice of equal awe and value with that which had formerly obtained it for the Roman. It is to be remembered, that not only the pagans, but also the Christians of that age, knew and believed in these legends and omens, however they might differ as to the nature of the superhuman agency, by which such mysteries had been made known to mankind. And we may observe, with Herbert, a modern learned dignitary of our Church, how remarkably this augury was fulfilled. For, "if to the twelve centuries, denoted by the



twelve vultures that appeared to Romulus, we add for the six birds that appeared to Remus six lustra, or periods of five years each, by which the Romans were wont to number their time, it brings us precisely to the year 476, in which the Roman Empire was finally extinguished by Odoacer,"

An attempt to assassinate Attila, made, or supposed to have been made at the instigation of Theodosius the younger, the Emperor of Constantinople, drew the Hunnish armies, in 445 upon the Eastern Empire, and delayed for a time the destined blow against Rome. Probably a more important cause of delay- was the revolt of some of the Hunnish tribes to the north of the Black Sea against Attila, which broke out about this period, and is cursorily mentioned by the Byzantine writers. Attila quelled this revolt and having thus consolidated his power, and having punished the presumption of the Eastern Roman Emperor by fearful ravages of his fairest provinces, Attila, in 450 AD prepared to set his vast forces in motion for the conquest of Western Europe. He sought unsuccessfully by diplomatic intrigues to detach the king of the Visigoths from his alliance with Rome and he resolved first to crush the power of Theodoric, and then to advance with overwhelming power to trample out the last sparks of the doomed Roman Empire.

A strange invitation from a Roman princess gave him his pretext for the war, and threw an air of chivalric enterprise over his invasion. Honoria, sister of Valentinian III., the Emperor of the West had sent to Attila to offer him her hand, and her supposed right to share in the imperial power. This had been discovered by the Romans, and Honoria had been forthwith closely imprisoned. Attila now pretended to take up arms in behalf of his self-promised bride, and proclaimed that he was about to march to Rome to redress Honoria's wrongs. Ambition and spite against her brother must have been the sole motives that led the lady to woo the royal Hun; for Attila's face and person had all the national ugliness of his race, and the description given of him by a Byzantine ambassador, must have been well known in the imperial courts. Herbert has well versified the portrait drawn by Priscus of the great enemy of both Byzantium and Rome:-

"Terrific was his semblance, in no mold
Of beautiful proportion cast; his limbs
Nothing exalted, but with sinews braced
Of Chalybaean temper, agile, lithe,
And swifter than the roe; his ample chest
Was overbrowed by a gigantic head,
With eyes keen, deeply sunk, and small, that gleam'd
Strangely in wrath, as though some spirit unclean
Within that corporal tenement install'd.
Look'd from its windows but with temper'd fire
Beam'd mildly on the unresisting Thin
His beard and hoary; his flat nostrils crowned
A cicatrised, swart visage, — but withal
That questionable shape such glory wore
That mortals quailed beneath him."

Two chiefs of the Franks who were then settled on the Lower Rhine, were at this period engaged in a feud with each other; and while one of them appealed to the Romans for aid the other invoked the assistance and protection of the Huns. Attila thus obtained an ally, whose cooperation secured for him the passage



of the Rhine; and it was this circumstance which caused him to take a northward route from Hungary for his attack upon Gaul. The muster Of the Hunnish hosts was swollen by warriors of every tribe that they had subjugated nor is there any reason to suspect the old chroniclers of willful exaggeration in estimating Attila's army at seven hundred thousand strong. Having crossed the Rhine, probably a little below Coblentz, he defeated the Kings of the Burgundians, who endeavored to bar his progress. He then divided his vast forces into two armies, – one of which marched north-west upon Tongres and Arras, and the other cities of that part of France; while the main body, under Attila himself, marched up the Moselle and destroyed Besancon, and other towns in the country of the Burgundians, One of the latest and best biographers of Attila well observes, that, "having thus conquered the eastern part of France, Attila prepared for an invasion of the West Gothic territories beyond the Loire. He marched upon Orleans, where he intended to force the passage of that river, and only a little attention is requisite to enable us to perceive that he proceeded on a systematic plan: he had his right wing on the north, for the protection of his Frank allies; his left wing on the south, for the purpose of preventing the Burgundians from rallying, and of menacing the passes of the Alps from Italy and he led his center towards the chief object of the campaign – the conquest of Orleans, and an easy passage into the West Gothic dominion. The whole plan is very like that of the allied powers in 1814 with this difference, that their left wing entered France through the defiles of the Jura in the direction of Lyon, and that. the military object of the campaign was the capture of Paris."

It was not until the year 451 that the Huns commenced the siege of Orleans; and during their campaign in Eastern Gaul, the Roman general Aetius had strenuously exerted himself in collecting and organizing such an army as might, when united to the soldiery of the Visigoths, be fit to face the Huns in the field. He enlisted every subject of the Roman Empire, whom patriotism, courage, or compulsion could collect beneath the standards; and round these troops, which assumed the once proud title of the legions of Rome, he arrayed the large forces of barbaric auxiliaries, whom pay, persuasion, or the general hate and dread of the Huns, brought to the camp of the last of the Roman generals. King Theodoric exerted himself with equal energy. Orleans resisted her besiegers bravely as in after times. The passage of the Loire was skillfully defended against the Huns; and Aetius and Theodoric, after much maneuvering and difficulty, effected a junction of their armies to the south of that important river.

On the advance of the allies upon Orleans, Attila instantly broke up the siege of that city, and retreated towards the Marne. He did not choose to risk a decisive battle with only the central corps of his army against the combined power of his enemies; and he therefore fell back upon his base of operations; calling in his wings from Arras and Besancon and concentrating the whole of the Hunnish forces on the vast plains of Chalons-sur-Marne. A glance at the map will show how scientifically this place was chosen by the Hunnish general, as the point for his scattered forces to converge upon; and the nature of the ground was



eminently favorable for the operations of cavalry the arm in which Attila's strength peculiarly lay.

It was during the retreat from Orleans that a Christian hermit is reported to have approached the Hunnish king, and said to him, "Thou art the Scourge of God for the chastisement of Christians." Attila instantly assumed this new title of terror, which thenceforth became the appellation by which he was most fearfully known.

The confederate armies of Romans and Visigoths at last met their great adversary, face to face, on the ample battle-ground of the Chalons plains. Aetius commanded on the right of the allies; King Theodoric on left; and Sangipan, King of the Alans, whose fidelity was suspected, was placed purposely in the center, and in the very front of the battle. Attila commanded his center in person, at the head of his own countrymen, while the Ostrogoths, the Gepidae and the other subject allies of the Huns, were drawn up on the wings. Some maneuvering appears to have occurred before the engagement in which Aetius had the advantage, inasmuch as he succeeded in occupying a sloping hill, which commanded the left flank of the Huns Attila saw the importance of the position taken by Aetius on the high ground and commenced the battle by a furious attack on this part of the Roman line in which he seems to have detached some of his best troops from his center to aid his left. The Romans, having the advantage of the ground repulsed the Huns, and while the allies gained this advantage on their right their left, under King Theodoric, assailed the Ostrogoths, who formed the right of Attila's army. The gallant king was himself struck down by a javelin, as he rode onward at the, head of his men, and his own cavalry charging over him trampled him to death in the confusion. But the Visigoths, infuriated, not dispirited, by their monarch's fall, routed the enemies opposed to them, and then wheeled upon the flank of the Hunnish center, which had been engaged in a sanguinary and indecisive contest with the Alans.

In this peril Attila made his cantle fall back upon his camp; and when the shelter of its entrenchment's and wagons had once been gained, the Hunnish archers repulsed, without difficulty, the charges of the vengeful Gothic cavalry. Aetius had not pressed the advantage which he gained on his side of the field, and when night fell over the wild scene of havoc, Attila's left was still unbroken, but his right had been routed, and his center forced back upon his camp.

Expecting an assault on the morrow, Attila stationed his best archers in front of the cars and wagons which were drawn up as a fortification along his lines, anti made every preparation for a desperate resistance. But the "Scourge of God" resolved that no man should boast of the honor of having either captured or slain him; and he caused to be raised in the center of his encampment a huge pyramid of the wooden saddles of his cavalry: round it he heaped the spoils and the wealth that he had won, on it he stationed his wives who had accompanied him in the campaign; and on the summit Attila. placed himself, ready to perish in the flames, and baulk the victorious foe of their choicest booty, should they succeed in storming his defenses.

But when the morning broke, and revealed the extent of the carnage, with which the plains were heaped for miles, the



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successful allies saw also and respected the resolute attitude of their antagonist. Neither were any measures taken to blockade him in his camp, and so to extort by famine that submission which it was too plainly perilous to enforce with the sword. Attila was allowed to march back the remnants of his army without molestation, and even with the semblance of success.

It is probable that the crafty Aetius was unwilling to be too victorious. He dreaded the glory which his allies the Visigoths had acquired; and feared that Rome might find a second Alaric in Prince Thorismund, who had signalized himself in the battle, and had been chosen on the field to succeed his father Theodoric. He persuaded the young king to return at once to his capital: and thus relieved himself at the same time of the presence, of a dangerous friend, as well as of a formidable though beaten foe. Attila's attacks on the western empire were soon renewed; but never with such peril to the civilized world as had menaced it before his defeat at Chalons. And on his death, two years after that battle, the vast empire, which his genius had founded, was soon dissevered by the successful revolts of the subject nations. The name of the Huns ceased for some centuries to inspire terror in Western Europe, and their ascendancy passed away with the life of the great king, by whom it had been so fearfully augmented.

If I seem to have given fewer of the details of the battle itself than its importance would warrant, my excuse must be, that Gibbon has enriched our language with a description of it, too long for quotation and too splendid for rivalry. I have not, however, taken altogether the same view of it that he has. The notes to Mr. Herbert's poem of "Attila" bring together nearly all the authorities on the subject.

453 CE

February/March: Both in [China](#) and in Rome, a [comet](#) was seen in the western portion of the heavens. (Since a comet would be recorded as having preceded the death of Attila the Hun, this one was presumably the dude that done that dirty deed.)

SKY EVENT

520 CE

We don't know whether or not the [comet](#) of this year was an especially bright one, or instead a very ordinary one, since we don't know whether to translate the [Chinese](#) to have meant "day," meaning so bright as to be visible during the day, or to have meant "dawn," meaning before sunrise.

SKY EVENT

530 CE

September 27: [Halley's Comet](#) whipped around the sun. On this visit a Byzantine source would tag the label “Lampadias” onto it, a word meaning “lamp-like” that served as an identifier for one of the known types of [comet](#). During this year there were a plenty of the Eta Aquarid meteors that accompany the comet, plunging into our atmosphere. If King Arthur and Guinevere and the knights of the round table were historical figures, which is doubtful — they might well have witnessed this.

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This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, [→](#) 1,057 BCE, [→](#) 466 BCE, [→](#) 391 BCE, [→](#) and 315 BCE, [→](#) but then on the 240 BCE [→](#) return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE [→](#) and again in 87 BCE, [→](#) and then it was recorded as being seen in 12 BCE, [→](#) 66 CE, [→](#) 141 CE, [→](#) 218 CE, [→](#) 295 CE, [→](#) 374 CE, [→](#) 451 CE, [→](#) 530 CE, [→](#) 607 CE, [→](#) 684 CE, [→](#) 760 CE (only by Chinese), [→](#) 837 CE, [→](#) 912 CE, [→](#) 989 CE, [→](#) 1066, [→](#) 1145, [→](#) 1222, [→](#) 1301, [→](#) 1378, [→](#) 1456, [→](#) 1531, [→](#) 1607, [→](#) 1682, [→](#) 1758, [→](#) 1835, [→](#) 1910, [→](#) and 1986 [→](#) — and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



HALLEY'S COMET



EDMOND HALLEY

565 CE

July 22: Two [comets](#) were seen in this year, the second one becoming visible on this night after passing around the [sun](#) on July 15th and then remaining visible for about 100 nights while it transited out of the constellation of Ursa Major into the constellation of southern Pegasus, and then into the constellation of northern Aquarius — where eventually it would disappear. While that [comet](#) was in Pegasus its tail was 15 degrees in length.

SKY EVENT

ASTRONOMY

ASTRONOMY

September 13: We can now calculate that it was on this night that the brighter of the two [comets](#) seen in this year got closest to Earth, at 0.54 astronomical units.

SKY EVENT

568 CE

September 25: A great [comet](#) whizzed by at a distance of only 0.09 astronomical units on its way out from whipping around the [sun](#). (This comet may have been sighted on July 28th in the constellation of Libra — or, possibly, what had been seen there was a nova.)

SKY EVENT

585 CE

During this year there were hundreds of Orionid meteors in showers scattering “in all directions,” the Halley-derived Orionid swarm being associated with the inbound portion of [Halley’s Comet](#)’s looping trajectory.

SKY EVENT

595 CE

The 1st authenticated record of a decimal number system (0-9), in [India](#).

607 CE

March 15: [Mohammed](#) was a young man who had not yet begun to have his religious experiences.



On this date [Halley’s Comet](#) whipped around the [sun](#) during what was probably its 2d-brightest recorded appearance. It was in a different constellation almost every night. If this [comet](#) had been about five days earlier in its passage through the orbit of the Earth, it might have dived by us at about 2/3ds of the distance of the Moon, but instead it passed the planet behind it in its orbit, at 0.09 astronomical units. Surprisingly, the only records of observation we have of this visit are from [China](#).

SKY EVENT



HALLEY'S COMET



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EDMOND HALLEY

615 CE

The earliest record we have of teachings by Mohammed dates to this year. There was a siege in Mecca, and some of his early followers were obliged to flee temporarily to Ethiopia.



Beginning in this year and continuing into 618 CE, Deusdedit would be Pope.

The tail of a comet sighted during this year was seeming to undulate:

It measured $1\frac{1}{2}$ degree, looked black, and pointed and scintillated as it moved toward the northwest for several days until it reached Ursa Major.

SKY EVENT

684 CE

October 2: [Halley's Comet](#) whipped around the sun after having passed fairly close in front of Earth. This is its first visit recorded in the Japanese islands, where civilized culture had been rather late in starting: only recently had the rulers begun to style themselves emperors in a model based upon the Chinese culture. Eight centuries later, 32 human generations later, in the Year of Our Lord 1493, there would be published a book known as the NUREMBERG CHRONICLES, in which this appearance would be considered worthy of a woodcut. At that point it would be being claimed with entire unreliability that the [comet](#) had brought with it three months of storm and rain, the withering of crops, plague, and an eclipse of the [sun](#) and the [moon](#).

SKY EVENT

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HALLEY'S COMET



EDMOND HALLEY

760 CE

May 20: [Halley's Comet](#) whipped around the [sun](#). On this visit it passed north of Sol between a period of morning visibility and a period of evening visibility. During May and June some Byzantine writers would be recording a bright [comet](#) in the shape of a beam, as appearing first in the east for ten days and then in the west for 21 days.

SKY EVENT

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HALLEY'S COMET



EDMOND HALLEY

August 15, 760 CE: [Eclipse](#) of the sun.

SKY EVENT

770 CE

May 26: First observation of a bright new [comet](#).

SKY EVENT



ASTRONOMY

June 5: The bright new [comet](#) passed around the sun.

SKY EVENT

June 19: The great [comet](#) began to appear to move eastward, approaching the constellation of northern Auriga.

SKY EVENT

July 9: The great [comet](#) was in the constellation of northern Canes Venatici.

SKY EVENT

July 10: The bright new [comet](#) passed at 0.3 astronomical units from the earth. It was visible in the north, with a tail extending about 75 degrees.

SKY EVENT

July 25: Last sighting of the great [comet](#) of this year.

SKY EVENT

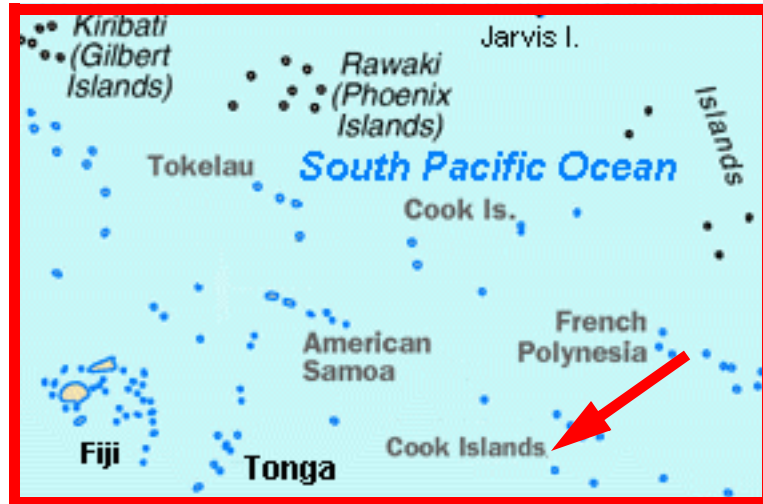
800 CE

In Ireland, the Book of Kells was being illuminated. The first castles were being erected in western Europe. Arabs and Persians were exploring the East African coast and setting up trading stations at Malindi, Mombasa, Kilwa, and Mogadishu. By this point the astrolabe was highly developed in the Islamic world. The device would not be introduced from Andalusia (Islamic Spain) into Europe, however, until the early 12th Century.

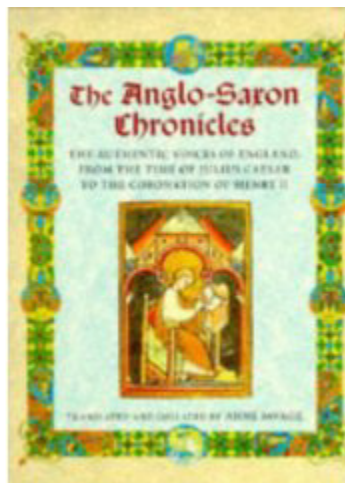


(The instrument pictured above would be crafted in Europe in 1532.)

In the Pacific, the tradition is that Ru, who sailed from Tupua'i in French Polynesia, landed in about this timeframe on Aitutaki and Tangiia and perhaps Rarotonga in the [Cook Islands](#). The master mariner Ru had not, of course, ever seen, or, it seems, did he have any need of, such an astrolabe.



ANGLO-SAXON CHRONICLES



807 CE

A large [sunspot](#) was visible on the face of the sun. A few years later this would be interpreted as having been a forecast of the demise of [Charlemagne](#).



SKY EVENT

813 CE

August 4: Someone in Constantinople claimed to have seen a comet that looked like two moons joined together. The two parts came apart and one part took the shape of a man without a head. — Was this a [comet](#) or was it a figment?

SKY EVENT

817 CE

An observer in [China](#) claimed to have sighted a [meteor](#) which was making a sound. He alleged that the sound it made was “like a flock of cranes in flight.”

SKY EVENT



ASTRONOMY

ASTRONOMY

February 5: According to *VITA LUDOVICI PII*, at the second hour of the night a monstrous [comet](#) was observed in the constellation of Sagittarius.

SKY EVENT

February 17: A [comet](#) with a tail three degrees long appeared in the constellation Taurus. Over the next three nights it would head into the constellation of Orion and disappear.

SKY EVENT

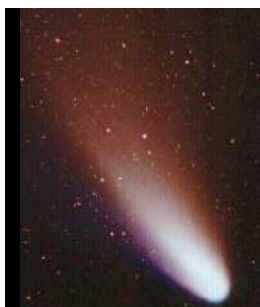
820 CE

During this decade, the Persian mathematician Mohammed ibn Musa al-Khowarizmi would, in *DE NUMERO INDORUM* “Concerning the Hindu Art of Reckoning,” be developing a system of [algebra](#), giving a set of rules for computation with Hindu-Arabic numerals. (Now we call these rules “algorithms,” the very name of the topic being based upon the name of this person.)

837 CE

February 28: [Halley’s Comet](#) whipped around the [sun](#) and on its way back out would accomplish its closest/brightest recorded passing of Earth.

SKY EVENT



HALLEY'S COMET



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EDMOND HALLEY

April 10: On this night, since [Halley's Comet](#) was passing us at but 0.03 astronomical units, closer than any other great comet on the historical record, it should have seemed as bright as Venus. It was passing only 13 times as far away as our moon, and in this one 24-hour period its apparent motion was across a third of the visible celestial vault over our heads. Its tail had by this point become so broad as to also span across a third of this vault of ours, in several branches.

SKY EVENT

April 11: Our perspective on [Halley's Comet](#) having been changed by its and by our own motion, the branches which had been visible in its tail on the previous night were no longer visible on this night. However, the tail had perceptibly lengthened.

SKY EVENT

April 13-14: The tail of [Halley's Comet](#) was on these nights seen to be spanning across 90 degrees, fully half of the visible celestial vault over our heads. In 1493 this would be depicted in one of the woodcuts of the NUREMBERG CHRONICLES. King Louis the Pious, who was something of a worrier, was suspecting that this bucket of stuff in the sky was an omen that he was about to kick the bucket (although we now know by our hindsight that the guy wouldn't be shuffling off our mortal coil until 840 CE).¹⁵

SKY EVENT

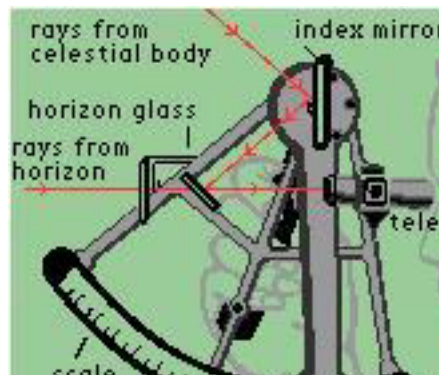
15. The perennial poop that "[Charlemagne](#) was terrified of the celestial wanderer" results from an evident confusion of him with this King Louis, who was his son.

850 CE

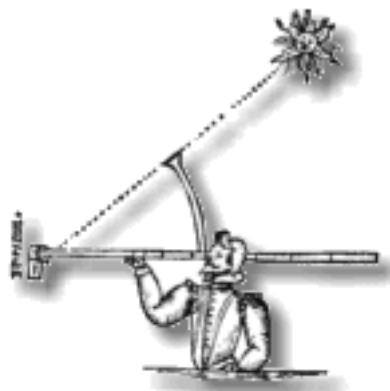
From the middle of the 9th century until 1831 all Muslim kingdoms would be purchasing white male [slaves](#), mainly Turkish prisoners and Circassians from Russia, the Caucasus and central Asia, and forming them into regiments of guards known as Mamelukes. The Mamelukes, from the Arabic term *mamluk* meaning “owned,” like the Praetorian Guard at Rome, would soon begin to exert considerable influence over affairs of state.

INTERNATIONAL SLAVE TRADE

At approximately this point, Arabs were perfecting the astrolabe. Henceforth, at midday at sea each day on which the sun would be visible, every ship’s captain could be observed taking his ship’s location with this instrument, and then calculating the ship’s latitude with the help of tables:



The captain’s observations would be being checked against major errors by the ship’s mate, using the older and less accurate cross staff:



The ship’s current speed would of course be checked with a log on a knotted cord thrown out behind the ship, paying out the cord for the duration of an upturned sand-glass.



ASTRONOMY

ASTRONOMY

868 CE

A [comet](#) not then identifiable, the orbit of which had been gradually changing in previous centuries, for the first time in this year crossed Earth's orbit on the inside. There would be numerous accounts of meteor showers in succeeding centuries, beginning in the year 902 CE, amounting in general to remarks such as "Stars fell like rain."

SKY EVENT

875 CE

June 5: The [Japanese](#) observed a red [comet](#) with pointed rays toward the northeast.

SKY EVENT

June 7: A burning star showed itself in the skies over France, and it would be passed about that this had been announcing the death of King Louis II, which would occur on April 10th, 879 CE.

COMET

SKY EVENT

June 9: The [comet](#)'s tail extended over 15 degrees in the constellation of northern Auriga.

SKY EVENT

June 24: The [comet](#) had transited from being a "broom star" with a tail into being described as a "bushy star," that is, tailless.

SKY EVENT

880 CE

880 CE-909 CE: Al-Battani (Albategnius), who would more accurately calculate the length of the year and the precession of the equinoxes.

CALENDAR

ASTRONOMY



886 CE

November 16: On this night the second [comet](#) of this year was first observed, over [China](#). It was described as a “long path” comet, and as white in color, 21 degrees in length, bent at an angle (modern astronomers suggest that the comet may have had two tails, one directed toward the sun as well as the one directed away from it). The Chinese thought later that they observed this comet to fall like a meteor.

SKY EVENT

891 CE

May 12: A great [comet](#) was observed in the constellation of Ursa Major.

SKY EVENT

July 5: The [comet](#) would not be observed after this night. During the period of observation it had generally been traversing the sky toward the east, “sweeping” the constellation of Arcturus and on into the region of the constellations Hercules/Aquila/Serpens/Ophiuchus.

SKY EVENT

At about this point some monks were writing the history of England, as the ANGLO-SAXON CHRONICLE.

892 CE

A number of comets were seen this year. In Europe during the winter, one was seen to appear in the tail of the constellation of Scorpius for a period of eighty days, after which the months of March and April were markedly droughty. In [China](#) in June, a [comet](#) was observed that was like a white banner and was shaped like hair, initially three degrees in length but after a few days stretching “from the midheaven to the horizon.”

SKY EVENT

December 28: According to a [Chinese](#) record, a [comet](#) of the type termed a “celestial magnolia tree” appeared to the southwest (perhaps in the constellation of Sagittarius).

SKY EVENT



ASTRONOMY

ASTRONOMY

December 31: The [comet](#) which a few days before had appeared to be like some sort of “celestial magnolia tree” on this night “turned into a cloud and faded away.” (Another report indicates that the sky was cloudy in [China](#) on this night, so this may have been merely a remark about difficulties of observation.)

SKY EVENT

893 CE

There may have been a great [comet](#) during this year as well as in 891 — or the record we have may merely be a confused repetition of that earlier report.

SKY EVENT

896 CE

There was either a [comet](#) or some sort of nova event toward the close of this year, continuing into the following year. The Chinese report of it was that during November and December, one large and two small “guest stars” moved eastward together through the constellation of northern Aquarius — “they sometimes approached one another, then separated, giving the illusion that they were fighting among themselves. After three days the two smaller ones disappeared while the larger one faded away in northern Aquarius.”

ASTRONOMY

CHINA

900 CE

The next couple of centuries we now term the “Medieval Warm Period,” because temperatures throughout the Northern Hemisphere were remarkably similar to those that we have observed during the first half of the 20th Century. We can detect this period of unusual warmth in the thicker-than-usual tree rings, in ice cores from Greenland, and in coral reefs. Apparently, this two centuries of warm weather was caused by a temporary brightening of the [sun](#)?

901 CE

October 26: According to Eutychius of Alexandria (877-940 CE), in the hours before dawn so very many shooting stars had been scattering “east and west, south and north” that some in [Egypt](#) had been fearful to glance toward the sky.

ASTRONOMY



902 CE

The 1st preserved account of the Leonid meteor shower, observed by [Chinese](#) astronomers. There would be numerous accounts in the succeeding centuries, amounting in general to remarks such as “Stars fell like rain.”¹⁶

905 CE

May 18: Something more or less similar in appearance to the planet Venus was observed in the evening sky, toward the northwest. This object was blood-red in color and was emitting rays of 45 to 60 degrees in length.

SKY EVENT

May 19: The object which had been seen as red on the previous night appeared on this night more like white silk.

SKY EVENT

May 25: We calculate that the [comet](#) which had been observed on May 18th and 19th was on this date passing by the earth at a distance of 0.21 astronomical units.

SKY EVENT

Early June: Since the [comet](#) was going down into the summer constellations, it could no longer be observed from Europe after mid-month.

SKY EVENT

907 CE

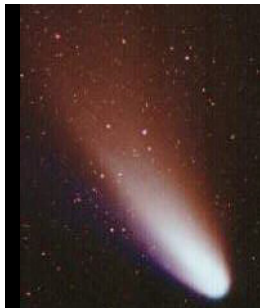
Death of Muslim ibn Ahmed al-Leiti, Abu 'Obeida (also called Sahib al-Qible), a native of Cordova who wrote on [astronomy](#) and arithmetic.

912 CE

July 18: [Halley's Comet](#) whipped around the sun. For this visit, the best sightings of the periodic [comet](#) we still have are in the Japanese *DAINIHONSHI*.

ASTRONOMY

16. The Leonids occurred in mid-October during the 10th century, late October during the 16th century, and mid-November during the 20th century.



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EDMOND HALLEY

**915 CE**

Sa'id ibn Ya'qub wrote on Greek mathematics.

- 640 Alexandria in Egypt is taken by the Saracens, and the grand library there burnt by order of Omar, their caliph or prince.
- 653 The Saracens now extend their conquests on every side, and retaliate the barbarities of the Goths and Vandals upon their posterity.
- 664 Glass invented in England by Benalt, a monk.
- 685 The Britons after a brave struggle of near 150 years, are totally expelled by the Saxons, and driven into Wales and Cornwall.
- 713 The Saracens conquer Spain.
- 726 The controversy about images begins, and occasions many insurrections in the eastern empire.
- 748 The computing of years from the birth of Christ began to be used in history.
- 749 The race of Abbas became caliphs of the Saracens, and encourage learning.
- 762 The city of Bagdad upon the Tigris is made the capital for the caliphs of the house of Abbas.
- 800 Charlemagne, king of France, begins the empire of Germany, afterwards called the western empire; gives the present names to the winds and months; endeavours to restore learning in Europe; but mankind are not yet disposed for it, being solely engrossed in military enterprises.
- 826 Harold, king of Denmark, dethroned by his subjects, for being a Christian.
- 828 Egbert, king of Wessex, unites the Heptarchy, by the name of England.
- 836 The Flemings trade to Scotland for fish.
- 838 The Scots and Picts have a decisive battle, in which the former prevail, and both kingdoms are united by Kenneth, which begins the second period of Scottish history.
- 867 The Danes begin their ravages in England.
- 896 Alfred the Great, after subduing the Danish invaders (against whom he fought 56 battles by sea and land), composes his body of laws; divides England into counties, hundreds, and tithings; erects county courts, and founds the university of Oxford about this time.
- 915 The university of Cambridge founded.
- 936 The Saracen empire is divided by usurpation into seven kingdoms.
- 975 Pope Boniface VII. is deposed and banished for his crimes.
- 979 Coronation oaths said to be first used in England.
- 991 The figures in arithmetic are brought into Europe by the Saracens from Arabia. Letters of the alphabet were hitherto used.
- 996 Otho III. makes the empire of Germany elective.
- 999 Boleslaus, the first king of Poland.



ASTRONOMY

ASTRONOMY

920 CE

circa 920 CE: At about this point, Rhazes (Ar-razi) was writing on geometry.

circa 920 CE: At about this point, Albategnius was writing on [astronomy](#).

circa 920 CE: At about this point, Odo of Cluny was writing on the abacus.

925 CE

925 CE-941 CE: The reign of King Aethelstan (Athelston, Ethelstan, Adelstan, Adelston, Edelstan, etc.), grandson of King Alfred, over England. According to a poem written in the 14th Century, Euclid was introduced into England during this period.

940 CE

In [China](#), the Dunhuang star map was being produced. This map utilized what –nevermind that Mr. Mercator would not come along until six centuries later– we now refer to as a “Mercator projection.”

ASTRONOMY

950 CE

circa 950 CE: In more or less this timeframe, Hasan was writing on the [calendar](#).

960 CE

Abu Ja’far al-Khazin wrote on geometry.



ASTRONOMY

ASTRONOMY

960 CE-969 CE: The abacus, and Hindu/Arab numerals (except for zero) were introduced into Europe by Gerbert Aurillac of Auvergne, France. The numerals would not become popular for some time. Gerbert would become Pope Sylvester II.

962 CE

A bright [comet](#) was viewed for 64 days during this year.

SKY EVENT

January 28: The [comet](#) of this year was first observed, in the constellation of western Pegasus.

SKY EVENT

February 19: The [comet](#) was moving toward the southwest, entering the constellation of Libra.

SKY EVENT

April 2: The [comet](#) went out of sight in the region near the star Alphard in the constellation of Alpha Hydrae.

SKY EVENT

970 CE

Hrotsvitha, a nun, wrote on number theory.

March 25, Good Friday: Lotharingian computists had forecast, incorrectly it would seem, that because it had been on a Friday that Adam had been created, on a Friday that Isaac had been sacrificed, on a Friday that the Red Sea had been parted, on a Friday that Jesus had been conceived, and on a Friday that Jesus had been crucified, and because on this day Good Friday coincided with the celebration of the Annunciation — the world was going to be brought to a completion.

MILLENNIALISM



ASTRONOMY

ASTRONOMY

973 CE

Jewish merchants known as the Radanites were offering white females as [slaves](#) in the marketplace at Mainz, as well as at [slave](#) markets in the Orient. These women were being exchanged, typically, for spices, aloe, musk, pearls, and precious stones.

INTERNATIONAL SLAVE TRADE

Birth of physicist, mathematician, and traveler Al-Biruni. His book HISTORY OF INDIA would be a best-seller and would introduce Hindu numerals to the Arab world.

**975 CE**

Al-Harrani wrote on Euclid.

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915 The university of Cambridge founded.

936 The Saracen empire is divided by usurpation into seven kingdoms.

975 Pope Boniface VII. is deposed and banished for his crimes.

979 Coronation oaths said to be first used in England.

991 The figures in arithmetic are brought into Europe by the Saracens from Arabia. Letters of the alphabet were hitherto used.

996 Otho III. makes the empire of Germany elective.

999 Boleslaus, the first king of Poland.

980 CE

Abu'l Wefa wrote on trigonometry.

ASTRONOMY

ASTRONOMY

Abbo of Fleury wrote a Computus.

989 CE

September 5: Although Eric the Red was already in Greenland, at this point probably only Bjarni Herjolfsson had



sighted America, and Eric probably would not land on an America continental shore until about 1000 CE. Hugh Capet was on the throne of France. Prince Vladimir of Kiev was becoming a Christian, for what that's worth. On this date [Halley's Comet](#) whipped around the [sun](#), and as the [comet](#) had recently plunged past the earth some [Chinese](#) had seen it with the naked eye as blue-white, which means that it had been still mostly gas without as yet much dust having been expelled from its nucleus.

ASTRONOMY



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY

993 CE

Bernward wrote on the theory of numbers.

Al-Masahi wrote on Ptolemy.



995 CE

Lotharingian computists had forecast that because it had been on a Friday that Adam had been created, on a Friday that Isaac had been sacrificed, on a Friday that the Red Sea had been parted, on a Friday that Jesus had been conceived, and on a Friday that Jesus had been crucified, and because in 970 CE Good Friday had coincided with the celebration of the Annunciation — that the world was going to be brought to a completion as of that day. When this didn't happen, somebody did some recalculations and inferred that, since the Feast of the Annunciation and Good Friday would also coincide in 992 CE, the End Times would be within 3 years after than — which would mean, before the end of the Year of Our Lord 995 CE (another disappointment, as recorded in Eugen Weber's APOCALYPSES. Cambridge MA: Harvard UP, 1999, pages 50-51).

MILLENNIALISM

1000 CE

At about this point Ibn-al-Haitham, also known as Alhazen, born in Basra (965 CE-1020 CE), was using spherical and parabolic mirrors in his investigations. He was aware of spherical aberration. He studied the magnification produced by lenses, and by atmospheric refraction. His work would be translated into Latin and in that language would become accessible to later European scholars.

HISTORY OF OPTICS

At about this point Byrhtferth was writing on the [calendar](#).

At about this point Ibn Yunis was writing on [astronomy](#).

At about this point Al-Majriti was writing on geometry.

At about this point Mansur ibn 'Ali was writing on trigonometry.

At about this point Alberuni was writing on Hindu mathematics.

At about this point Gerbert (Pope Sylvester II) was writing on arithmetic.

The mismatch between the [solar](#) year and the [lunar](#) one has always been a problem. In [India](#) at this point, a 360-day year [calendar](#) divided into 12 moons of 27 or 28 days was being introduced. Since this is 5.2425 days short of a solar year, the Indians would at regular intervals be adding an extra moon. They may also have begun to use months of 30 days, to get themselves a somewhat better match with the solar year.



1006 CE

In an Antarctic ice-core column we have discovered two spikes in nitrate ions trapped in air bubbles. One of these spikes dates to the creation of the Crab Nebula in 1054CE, and the other spike dates to this year 1006CE. Evidently in this year a strong pulse of gamma radiation had swept across the planet Earth noticeably, temporarily altering the atmosphere. At some location unknown to us a star unknown to us had blown up.

ASTRONOMY

1014 CE

February 25: The [comet](#) of the previous year was on this date passing a mere 0.04 astronomical units from Earth, on its plunge toward the sun — which marks this as one of the very closest encounters of which we have any record. It would have appeared to have been in the constellation of Auriga but does not seem to have been remarkably bright or to have had a particularly long tail.

SKY EVENT

March 7: The [comet](#) seems to have been last observed on this night. It was in the constellation of Perseus.

SKY EVENT

April 6: The [comet](#) that had passed close to the earth on February 25th at this point was whipping around the sun at a distance of 0.56 astronomical units.

SKY EVENT

1037 CE

Some sort of celestial event was observed from [Korea](#) during this year. It was described as five comets, each measuring seven to nine degrees in length. This may have been a [comet](#) — or the report may possibly be a misunderstood report of a bolide, which is an exploding meteor display.

SKY EVENT



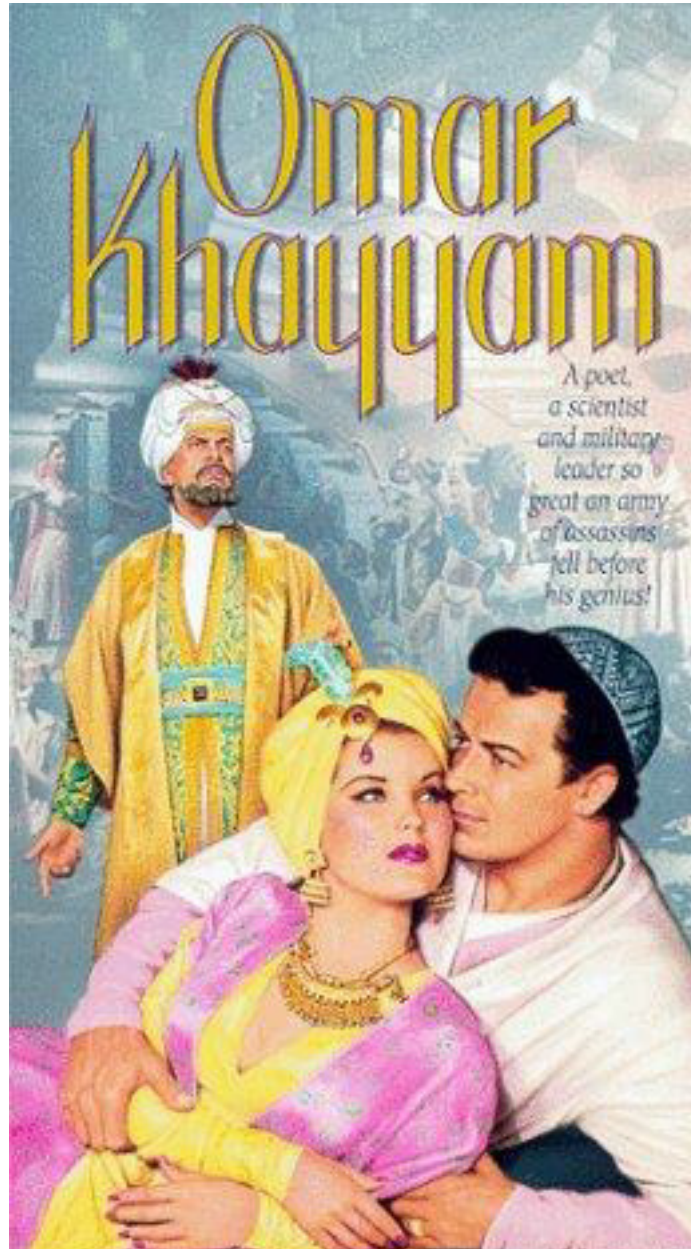
1048 CE

May 15, Monday: Traditional date of birth of the Persian mathematician, [astronomer](#), and poet [Omar Khayyam](#) (Ghiyath al-Din Abu'l-Fath Omar ibn Ibrahim Al-Nisaburi Khayyāmi یمغیث الدین ابو الفتح عمر بن ابراه (خیام نیشابوری), in Nishapur, the provincial capital of Khurasan in northeastern Iran, a town at an altitude of 3,920 feet. There appears to be no evidence whatever that he was born on this traditional date. It is, presumably, a pious fabrication committed by someone sometime. We think actually he was born in about 1038 to 1048, most likely 1044 — but hey, what does it matter? “Khayyam” means the tent-maker, and although generally he is considered as a Persian, it has also been suggested that he could have belonged to a tribe of Arab origin that settled in Persia. Little is known about his early life except that he was educated at Nishapur and lived there and at Samarqand for most of his life. He was a contemporary of Nidham al-Mulk Tusi. He would be the 1st to be able to solve some cubic equations, to wit, equations of degree three with the unknown raised to the third power and eventually would be recognized as the only person we know of, who was recognizably both a poet and a mathematician. Although patronage opportunities would be available to him, and although he would visit the great centers of learning in Samarqand, Bukhara, Balkh, and Isphahan in order to study and to interact with other scholars, he preferred a calm life devoted to inquiry and did not avail himself of the shah's court. While at Samarqand he was patronized by a dignitary, Abu Tahir.

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ASTRONOMY

ASTRONOMY





ASTRONOMY

ASTRONOMY

1054 CE

July 4: An exceedingly bright supernova was noticed, which would persist for 23 days (actually, the event had probably begun weeks or months before its first observation but had been concealed in the glow of the nearby sun).¹⁷ Astronomers in [China](#), receiving the light from this event, would record its brightness as about six times the brightness of the planet Venus.¹⁸ We now know that the supernova star had been about 7,000 light years away. The explosion created an extremely dense pulsar that is still spinning at the rate of about 30 times a second and still is emitting X-rays like crazy.¹⁹

ASTRONOMY

17. There is a suspicious lack of recordings of sightings in Europe, which has sometimes been accounted for by the supposition of a spell of bad weather, and sometimes as due to sensitive Papal negotiations that were at that point being consummated. For more on this controversy, refer to <<http://www.journals.uchicago.edu/PASP/journal/issues/v111n761/990049/990049.web.pdf>>.

18. The pulse of gamma radiation that swept across the planet Earth was strong enough to noticeably, temporarily alter the atmosphere. In an Antarctic ice-core column, we have found a spike dating to this year in the concentration of nitrate ions trapped in air bubbles in the ice then newly forming.

19. This was until recently the brightest on record: it has formed what today we refer to as the Crab Nebula. However, there was a report in the paper the other day, that an even brighter supernova has been found, one for which there now exists only astronomical evidence. In evaluating some electronic photos of the Veil nebula (Cygnus Loop, which extends for about three degrees across the northern sky) taken by the Hubble Space Telescope, and comparing them with earlier records of this wisp on a photographic plate exposed at the Palomar Mountain observatory in southern California in 1953, astronomers have been able to calculate from the movement of the strands across the background of stars that the wisp originated in a star some 15 times the mass of our Sol, that had been about 1,400 light years away and that the light from the explosion had arrived in the skies of the planet Earth *circa* 1,600 BCE. Such a supernova, at such a distance, must have produced in our night sky an event at least as noticeable as the full moon.

1066 CE

A [comet](#) appeared over France and England during the invasion by William the Bastard, Duke of Normandy and his glorious defeats of King Harold of England at Stamford Bridge on September 24th-25th and at Hastings on October 14th, and was duly depicted in the Bayeux Tapestry. It was P/Halley, though nobody knew.



William, at this point re-creating himself as The Conqueror, granted [Jersey](#) to some of the Norman knights who had helped him achieve the English crown. Here is a depiction from that isle in the English Channel.²⁰



This phenomenal object had been being observed in our heavens since 1404 BCE, though nobody knew.

20. Stamp Series: The Appearance of Halley's Comet; Issued March 4, 1986; Design: Jennifer Toombs; Printed in lithography by Cartor; Perforations 13½x13 - Stamp size 42mm x 28mm

(Everybody was entirely preoccupied.)

HALLEY'S COMET

ASTRONOMY

1000 Paper made of cotton rags was in use; that of linen rags in 1170; the manufactory introduced into England at Dartford, 1588.

1005 All the old churches are rebuilt about this time in a new manner of architecture.

1015 Children forbidden by law to be sold by their parents in England.

1017 Canute, king of Denmark, gets possession of England.

1040 The Danes, after several engagements with various success, are about this time driven out of Scotland, and never again return in a hostile manner.

1041 The Saxon line restored under Enward the Confessor.

1043 The Turks (a nation of adventurers from Tartary, serving hitherto in the armies of contending princes) become formidable, and take possession of Persia.

1054 Leo IX. the first pope that kept up an army.

1057 Malcolm III. king of Scotland, kills the tyrant Macbeth at Dunsinane; and marries the princess Margaret, sister to Edgar Atheling.

1065 The Turks take Jerusalem from the Saracens.

1066 The battle of Hastings fought between Harold and William (surnamed the bastard) duke of Normandy, in which Harold is conquered and slain; after which William becomes king of England.

1070 William introduces the feudal law.

Musical notes invented.

1075 Henry IV. emperor of Germany, and the pope, quarrel about the nomination

This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



HALLEY'S COMET



EDMOND HALLEY

At about this point Ernegis and Radulfus (Ralph) de Burun arrived in England, possibly in the company of Duke William the Bastard of Normandy.²¹ William would reign until his death in 1087 CE as The Conqueror. There would be frequent risings of the English against him, which, knowing how power is gained and lost, he would quell with remarkable and merciless rigour.

At this point Cahokia, just to the east of what has in our own timeframe become the city of St. Louis, at a population of about 30,000 souls, was as large as or larger than London or Paris, or any other city in Europe.

The Conquest of 1066 involved replacement of the Church establishment by French-speaking Normans who had a tradition of apple growing and cider making. They would introduce many apple types to Britain, the first recorded of which were the Pearmain and the Costard. The Pearmain was particularly valued for cider making. The Pearmain (Old English Pearmain) was first recorded in 1204. The manor of Runham in Norfolk had to pay to the Exchequer each year 200 Pearmain and 4 hogsheads of cider made from Pearmain. The Costard was first recorded in 1296 when 100 fruits were sold for 1 shilling. From the year 1325 there is a record that 29 Costard apple trees were sold for 3 shillings. The apple name is preserved in our word costermonger (originally a seller of Costard apples).

21. It is uncertain how Ralph and Ernegis were related, but they were most likely brothers. Tradition states that they arrived in England with William of Normandy and were given extensive lands as a reward for following him. [George Gordon, Lord Byron](#) would write of these early ancestors of his in "On Leaving Newstead Abbey" and again in DON JUAN, Canto X, verse 36:

"I can't complain, whose ancestors are there,
Erneis, Radulphus -eight and forty manors
(If that my memory doth not greatly err)
Were their reward for following Billy's banners;
And though I can't help thinking 't was scarce fair
To strip the Saxons of their hydes, like tanners;
Yet as they founded churches with their produce,
You'll deem, no doubt, they put it to good use."





ASTRONOMY

ASTRONOMY

March 20: [Halley's Comet](#) whipped around the [sun](#), while making one of its more startling appearances. The 77-yard tapestry which is preserved in the cathedral of Bayeux in Normandy put the matter succinctly, for it shows a crowd of Saxons pointing up at the [comet](#), and the image of the comet has beside it the words "*Isti Mirant Stella*": "These marvel at the star." In their life experience, visitors were very bad news. After its perihelion on this date, it would pass behind Earth at 0.1 astronomical units of distance, and it would seem that at the same time it was exhibiting the sort of post-perihelion surge that comets sometimes display. At one point its tail was displaying three long rays. Changes in perspective meant that during the course of a night the tail might swing through remarkable changes in its angle of dangle across the sky. One comment that was made was that the comet "looked like the eclipsed moon, its tail rose like smoke halfway up the zenith."

SKY EVENT



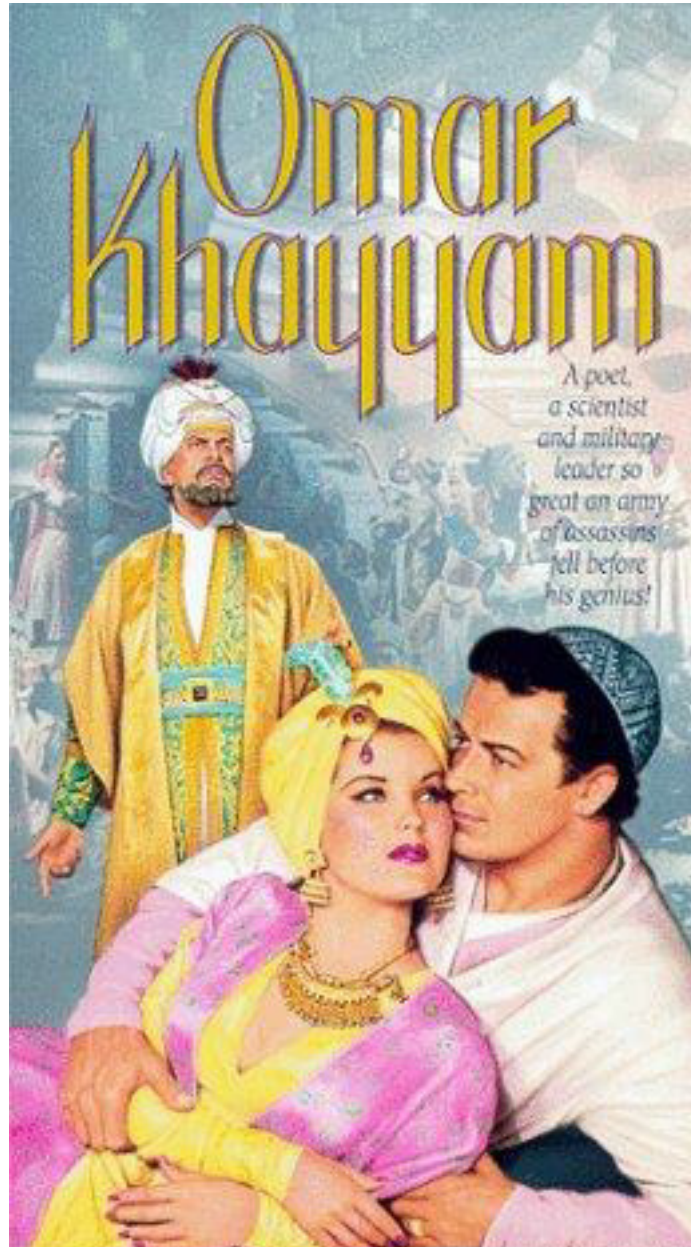
1068 CE

[Omar Khayyam](#) was 24 when he wrote his pioneering treatise on [algebra](#), so it would have been in about this year. The *MAQALAT FI AL-JABR WA AL-MUQABILA* classified many algebraic equations based on their complexity and recognized 13 different forms of cubic equation. It pioneered a geometrical approach to solving equations which involved an selection of proper conics, which is to say, the mathematician was able to solve cubic equations by intersecting a parabola with a circle. This was the first mathematical treatise to develop the binomial expansion when the exponent is a positive integer. Al-Khayyam has been considered to be the first to find the binomial theorem and determine binomial coefficients. He extended [Euclid](#)'s work giving a new definition of ratios and included the multiplication of ratios. He contributed to the theory of parallel lines. Although he referred in this Algebra book to another of his works, on what we now know as Pascal's triangle, this other mathematical treatise is now unfortunately lost. (Ten books and thirty monographs have survived. These include four books on mathematics, one on algebra, one on geometry, three on physics, and three on metaphysics.)

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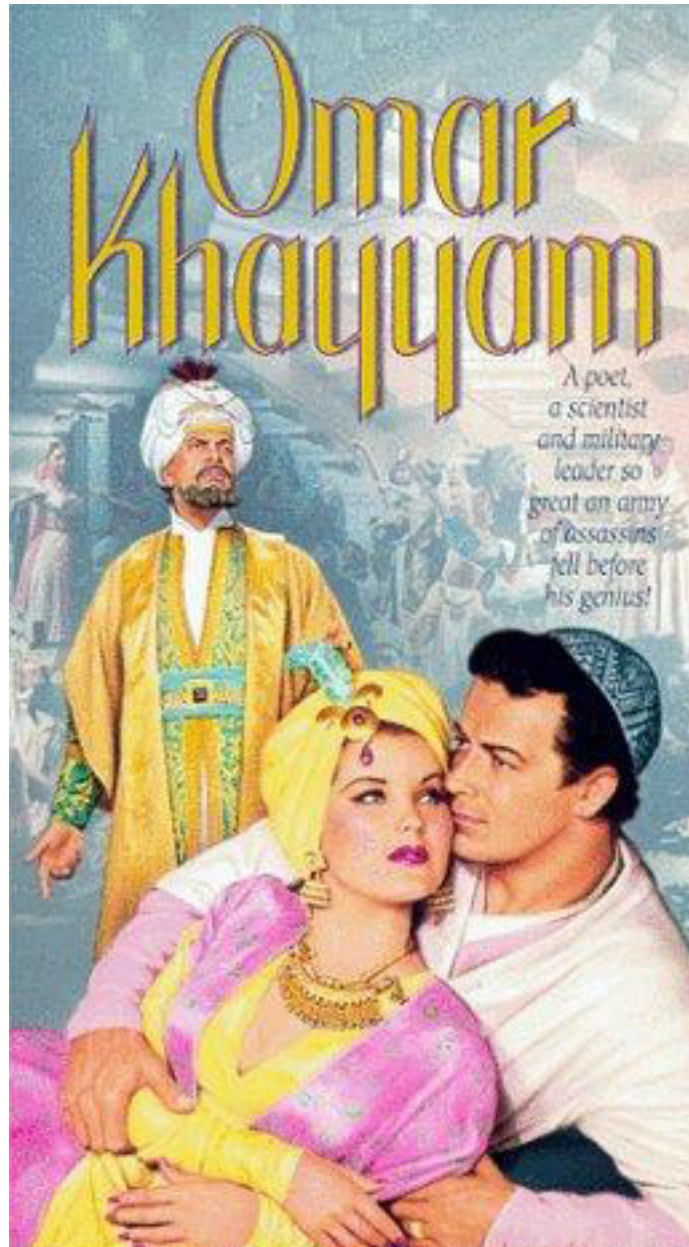
ASTRONOMY

ASTRONOMY



1074 CE

As astronomer to the Saljuq Sultan, Malikshah Jalal al-Din, [Omar Khayyam](#) was one of a group that was assigned to reform the [solar calendar](#) used for revenue collections and various administrative matters. To accomplish this task, a new observatory would be constructed at Ray, Iran.





ASTRONOMY

ASTRONOMY

1079 CE

March 15: As astronomer to the Saljuq Sultan, Malikshah Jalal al-Din, [Omar Khayyam](#) had been one of a group that had been assigned in 1074 to reform the [solar calendar](#) used for revenue collections and various administrative matters. A new observatory had been constructed at Ray. This day's date marked the beginning of the so-called Jalalian or Seljuk era in accordance with their new method of solar calculation. This "Al-Tarikh-al-Jalali" calendar was more accurate than the Julian Calendar and almost as accurate as the Gregorian intercalation system which the West would embrace in DATE, in that it is accurate to within one day in 3,770 years whereas the Gregorian error amounts to 1 day in 3,330 years. Specifically, this group of scholars measured the length of the year to eleven decimal places, as 365.24219858156 days. (This is not a fixed thing, but can and does exhibit real variance from epoch to epoch due to various peculiarities of the planets and satellites of our solar system, the length of the solar year in the 19th Century having been 365.242196 days but in our own era having become, at this point, 365.242190 days.)

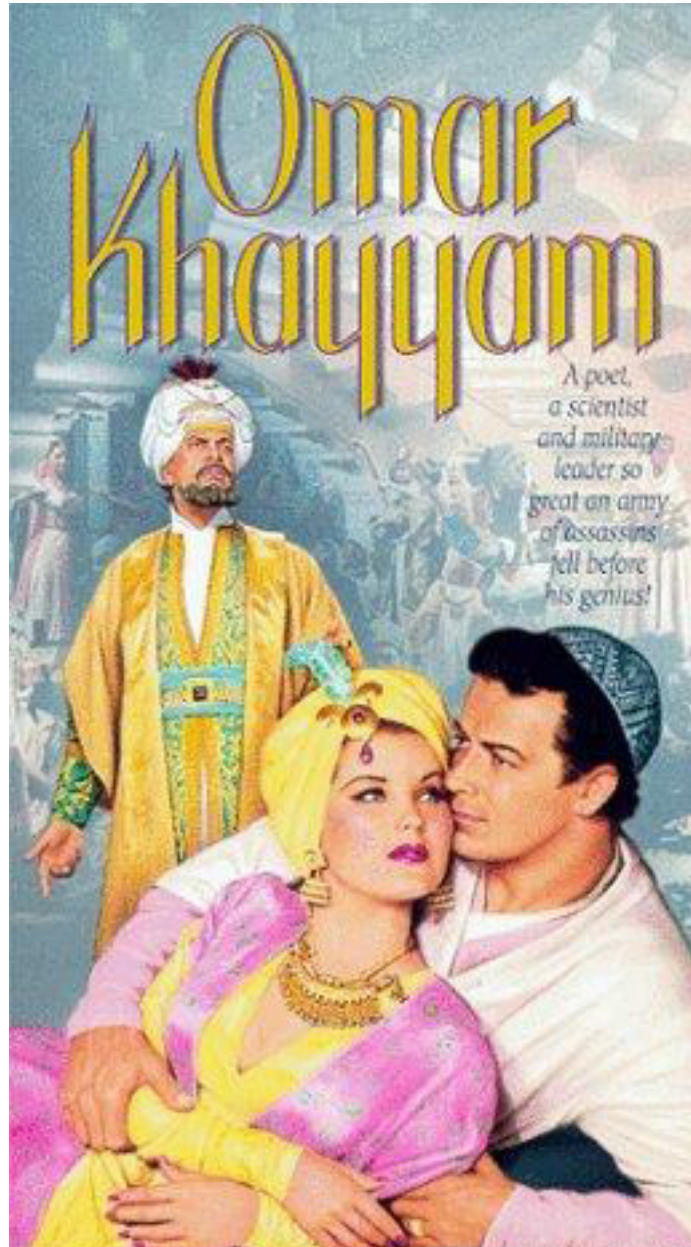
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ASTRONOMY



1090 CE

At about this point a mechanical clock, driven by water, was built in Kaifeng, which was the capital city of [China](#).

1097 CE

There was a large [comet](#) during this year.

SKY EVENT

1100 CE

This completes the couple of centuries we now term the “Medieval Warm Period,” because temperatures throughout the Northern Hemisphere were remarkably similar to those that we have observed during the first half of the 20th Century. We can detect this period of unusual warmth in the thicker-than-usual tree rings, in ice cores from Greenland, and in coral reefs. Apparently, this two centuries of warm weather was caused by a temporary brightening of the [sun](#)?

12th Century: Ibn Rushd (Averroes) was the 1st Western astronomer to notice [sunspots](#).

ASTRONOMY



ASTRONOMY

ASTRONOMY

During the early 12th Century, the [astrolabe](#) would be being introduced from Andalusia (Islamic Spain) into Europe.



(The instrument pictured above would be crafted in Europe in 1532.)

1106 CE

February 4/5: A star or [comet](#) described as a foot and a half (a degree or two?) from the sun was visible from Europe through most of this day. Its brightness may have been more than that of a half moon.

ASTRONOMY

February 7: After sunset, folks in Constantinople and Palestine were observing this [comet](#) in the southwest.

ASTRONOMY

February 9 and 10: Folks in the Orient were observing this [comet](#) in the west. It appeared to them to be about the size of “the mouth of a cup.” Its tail was perhaps 90 degrees in length and 5 degrees in width. They would leave a report that the rays from this object “scattered in all directions as if broken into fragments.” This comet may have been one of the two largest pieces of the hypothetical body referred to as the “parent of the sungrazers,” later disintegrated, which may still have been in one large chunk during a visit to the inner solar system sometime between 18,000 BCE and 8,000 BCE. → The comet would remain visible for a total of about a month, and may have been the Kreutz sungrazer that split and whose two main pieces would come back as the Great Comet of 1882 → and as the Ikeya-Seki comet of 1965.

ASTRONOMY

CHINA



ASTRONOMY

ASTRONOMY

February 16: There is a European record of a meteor that fell to earth. The observers presumed the meteor to have been part of the [comet](#).

ASTRONOMY

Mid-March: The great [comet](#) of this year faded from view.

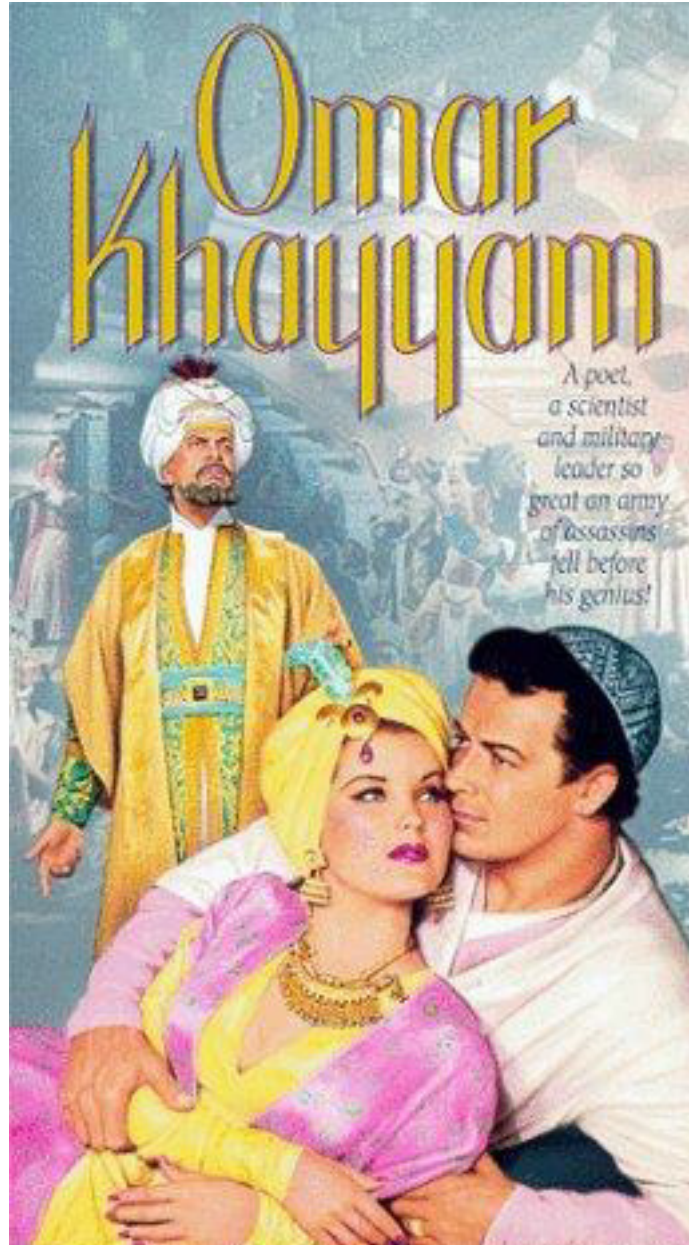
ASTRONOMY

ASTRONOMY

ASTRONOMY

1131 CE

December 4, Friday: Although this is the traditional date of death of the Persian astronomer, mathematician, and poet [Omar Khayyam](#) in Nishapur, Iran, it is likely that he was already deceased by 1125 CE.



**1132 CE**

August 30: A great sungrazing [comet](#) whipped around the sun at a distance of 0.36 astronomical units.

ASTRONOMY

October 7: The sungrazer passed by the earth at a distance of a mere 0.04 astronomical units on its way back into the dark stillness of outer space. It appeared as if it were traveling through the constellation of northern Aries and possessed an intensely bright reddish-tinted tail stretching across 45 degrees of the sky. Before disappearing this [comet](#) would move south through the constellation of eastern Pisces and beyond.


ASTRONOMY

1140 CE

March 20: A total [eclipse](#) of the [sun](#) was visible from the town of London.

There would not be another such total eclipse of the sun visible from London until May 3, 1715.²²

1145 CE

April 18: The [comet](#) which had appeared over France and England during the invasion by William the Bastard in 1066 CE and which they had depicted in their Bayeux Tapestry returned to whip again around the sun. During this visit the apparition would be visible for a total of 81 nights. It would appear that the monk Eadwine during this year decorated one of the pages of his Canterbury Psalter with a rather stylistic, but captioned, image of a comet, although it is entirely surmise that it was **this particular** comet that he was depicting. It was P/Halley, though nobody knew. It had been being observed in our heavens since 1,404 BCE,  though nobody had as yet put two and two together.

SKY EVENT

HALLEY'S COMET

22. By way of contrast, in accordance with the statistical law of probabilities there ought to be approximately one total solar eclipse visible in a given town for every four centuries. —But this law of probabilities cuts both ways, for in the Brisbane region of Australia, in 1856-1857, two total solar eclipses would occur less than a year apart!

SKY EVENT



HALLEY'S COMET



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EDMOND HALLEY

1178 CE

June 25: Five monks of Canterbury, England noted a silent event on the moon, that may well have been the formation by meteor impact of the lunar crater we have now named Giordano Bruno.

ASTRONOMY

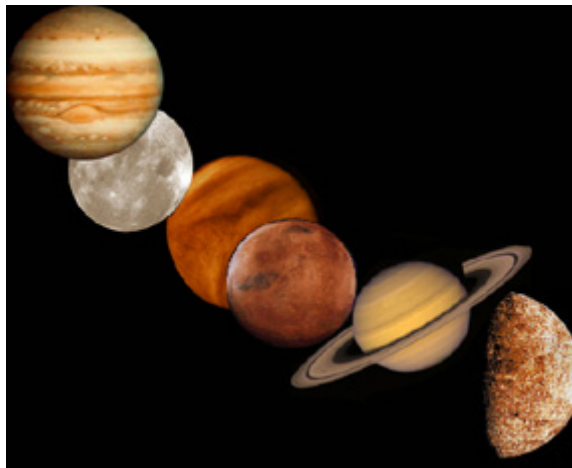
1181 CE

The [Chinese](#) and [Japanese](#) noted a stellar explosion in the constellation Cassiopeia. We now know the object that was produced by this sky event as 3C58, about 10,000 light-years away. If this is a neutron star, it is strangely cool for an object that had come into existence only 821 years before. The speculation now is that at least the core of this object is constituted of something other than densely packed neutrons, perhaps, astronomers have suggested, “a new kind of exotic material.” That substance may be densely packed quarks rather than neutrons, since the calculation is that this would result in more rapid cooling.

ASTRONOMY

1186 CE

September 23: John of Toledo, calculating that a planetary alignment would be occurring in Libra, had circulated a letter that had become known as the “Letter of Toledo,” alerting everyone that the world was going to be destroyed on this day of the Julian calendar although a few of us could hope to be able to survive the cataclysm (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 236).



HERE COME DA JUDGE!

1202 CE

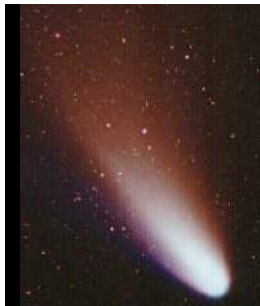
Leonardo of Pisa, also known as Fibonacci, began to recommend a Hindu number notation system the first digit of which, in Latin by way of Arabic, was designated the *zephyrum*. In Italian lingo this initial number would become known as the *zeuero* or *zepiro* (our zero).

1222 CE

September 8, evening: [Halley's Comet](#) was seen between 7PM and 9PM from [Japan](#), as a white broom-star with a center as large as a half-moon. It had rays, extending to 17 degrees across the sky, which appeared in the twilight to be red. It was on its way in toward the sun.

SKY EVENT

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HALLEY'S COMET



EDMOND HALLEY

This time the comet was looking down upon a planet on which Robert Grosseteste of England, *Magister scholarum* of the University of Oxford and a proponent of the attitude that theory needed to be compared with observation, had recently concluded that the properties of light must be of particular significance for natural philosophy. He was stressing the importance of mathematics and geometry in the study of the properties of light. He had come to understand that colors are related to intensity and that they extend from white to black (white being the purest and lying beyond red, while black was lying below blue). He had conjectured the rainbow to be a consequence of reflection and refraction of sunlight by layers in a “watery cloud,” although he was neglecting to consider the role of individual droplets as lenses. He continued in the presumption of earlier Greeks that vision involved emanations originating in the eye and moving toward the object perceived.

HISTORY OF OPTICS



ASTRONOMY

ASTRONOMY

September 9, daylight: We have a [Korean](#) record that [Halley's Comet](#) was visible during the daytime. Could this be a mistake or a mistranslation, or could the [comet](#) have been exhibiting an enormous pre-perihelion flare?

SKY EVENT

September 28: [Halley's Comet](#) whipped around the [sun](#).

SKY EVENT

1226 CE

Broad sheet glass was first made in Sussex, but it was of poor quality and fairly opaque.²³
(Manufacture would slowly decrease, and would cease by the early 16th Century.)

GLASS WINDOWS

1229 CE

The church at Firenzi banned the new Arabic numerals that had been brought back by the Crusaders. They seemed dangerously Muslim. And what was this utterly strange marker shaped like an empty circle, indicating nothing? –Something to deceive faithful Christians with, no doubt!

ANTISEMITISM

1230 CE

May 14: Roger of Wendover reported on the total [eclipse](#) of the [sun](#) which occurred early on that morning in Western Europe: “and it became so dark that the labourers, who had commenced their morning’s work, were obliged to leave it, and returned again to their beds to sleep; but in about an hour’s time, to the astonishment of many, the Sun regained its usual brightness.”

SKY EVENT

23. The techniques of mathematics, of the measurement of time, of the production of permanent photographic images, and of the manufacture of glass are equivalently vital in [Astronomy](#), as limiting items in the pace of its discoveries. Therefore, in considering the History of Astronomy, we need always to bear in mind the pace of the development of glass manufacturing skills and capabilities.

MATHEMATICS

CHRONOMETRY

PHOTOGRAPHY

GLASSMAKING

**1240**

January 27: A reddish-white [comet](#) was first seen (at first observation it was on its way back out of the solar system, after having passed around the sun at a distance of 0.67 astronomical units on January 21st).

SKY EVENT

February 1: At this point the reddish-white [comet](#) that had been visible since January 27th was noted to be “at the side of Jupiter, the same size as Venus.” (The comet would pass by the earth at 0.36 astronomical units in distance, on the following day.)

SKY EVENT

1264

July 21: A [comet](#) was noted, the tail of which would be extending to 100 degrees, one that would be “illuminating the heavens” from a position in the constellation of northern Hydra, which would then continue on through Hydra and Gemini into eastern Orion.

SKY EVENT

July 29: The bright [comet](#) of this year at this point was passing closest to Earth.
It would remain visible until October or November.

SKY EVENT

1267

In the strained circumstance of the Pope having asked to see something that did not exist, that had been merely a proposal and a request for funding/support, in this year and the following one, Franciscan friar [Roger Bacon](#), a follower of Grosseteste at Oxford, extended Grosseteste’s work on optics. He would be writing his *OPUS MAIUS* (GREAT WORK), which would not see print until 1733. This writing would include the 1st European mention of [Chinese](#) gunpowder, and the first description of spectacles for the farsighted. He praised a Master Nicholas about whom we have no information. In this work he considered that the speed of light was finite and that it was propagated through a medium in some manner analogous to the manner in which sound was propagating itself. He described how he had magnified small objects by the use of convex lenses, and suggested that that this sort of apparatus might find a useful application in the correction of deficient eyesight. He inferred that the phenomenon of the rainbow must be due to the reflection of sunlight within individual raindrops.

For we can so shape transparent bodies, and arrange them in such a way with respect to our sight and objects of vision, that the rays will be reflected and bent in any direction we desire, and under any angle we wish, we may see the object near or at a distance.... So we might also cause the Sun, Moon and stars in

appearance to descend here below....

HISTORY OF OPTICS

He would then create the *OPUS MINUS* (SMALLER WORK) and something we have titled the *OPUS TERTIUM* (THIRD WORK).



Since Bacon's superiors in his monastic order were hostile, he had to do all his writing in complete secrecy.

1270

In about this year Witelo of Silesia completed his *PERSPECTIVA*, which for several centuries would be a standard text on optics. He gave instructions for the machining of parabolic mirrors out of iron. He carried out careful observations on refraction and concluded that actually the angle of refraction was not quite proportional to the angle of incidence (presumably he got this result because he was unaware of total internal reflection).

1274

March 7: Thomas Aquinas injured his head while on his way to France for the Council of Lyon. Three days before he died at the Cistercian abbey of Fossanova, it has been alleged, a [comet](#) had appeared in order to bear his soul away — although we lack any other attestation or record that there was any sort of comet sighting at any time during this year.



ASTRONOMY

ASTRONOMY

1301

Chronological observations of America

*Flavio of Malphi in Naples invented the Compass
in our Edward the firsts time.*

From the year of the World *to the year of Christ 1673.*

BY John Josselyn Gent.

NAPLES

(Actually, the compass had been invented in [China](#) some 23 centuries earlier, give or take a lifetime.
Is that a long time, would you say, 2.3 millennia?)

September 1: Halley's [comet](#) appeared, remaining visible into the following month. A sighting device, the *torquetum*, was used to measure its angle — which perhaps counts as the first use of an astronomical instrument in the backward West. Peter of Limoges noted that although comets were warnings from a watchful God, their appearance did not of course bind the Almighty to any **predetermined** course of destruction.

HALLEY'S COMET



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY

October 25: [Halley's Comet](#) whipped around the [sun](#), having passed by Earth at 0.18 astronomical units of distance with a tail extending 50 or perhaps even 70 degrees. When perhaps four or five years later, the Florentine artist Giotto would paint a nativity scene in the Scrovegni Chapel at Padua, he would be having such a red-painted [comet](#) standing in as the fabulous Star of Bethlehem.

SKY EVENT

1303

Bernard of Gordon of France, a physician, mentioned the use of spectacles as a way of correcting long-sightedness.



ASTRONOMY

ASTRONOMY

1304

Theodoric (Dietrich) of Freiberg explained the rainbow as a consequence of refraction and internal reflection within individual raindrops. He gave an explanation for the appearance of a primary and secondary bow but, following earlier notions, considered color to arise from a combination of darkness and brightness in different proportions.

1330

French glassmakers were producing crown glass for the first time, at Rouen. Some of this French crown and broad sheet was imported into England.

GLASS WINDOWS

1337

Chronological observations of America

In Edward the third's time a Comet appeared, continuing 30 days.

*From the year of the World**to the year of Christ 1673.*

BY John Josselyn Gent.

COMETS



ASTRONOMY

ASTRONOMY

SKY EVENT

1345

A [comet](#) passed Earth at a mere 0.05 astronomical units.

SKY EVENT

1351

As in 1345, a [comet](#) passed Earth at a mere 0.05 astronomical units.

SKY EVENT

1366

October 26: The periodic [comet](#) Tempel-Tuttle passed a mere 0.03 astronomical units from Earth.

ASTRONOMY

1378

October 2: [Halley's Comet](#) was coming down this time across the North Pole at only 0.12 astronomical units in distance. (The perennial popular perception, that this particular comet was at one time blamed for the Black Death, is surely untrue, as in the first place that great plague had already occurred some three decades earlier and as in the second place it is understood by at least some of us, at least some of the time, that while earlier events do sometimes influence later events, later events never ever have any influence on the earlier ones. :-)

SKY EVENT



HALLEY'S COMET



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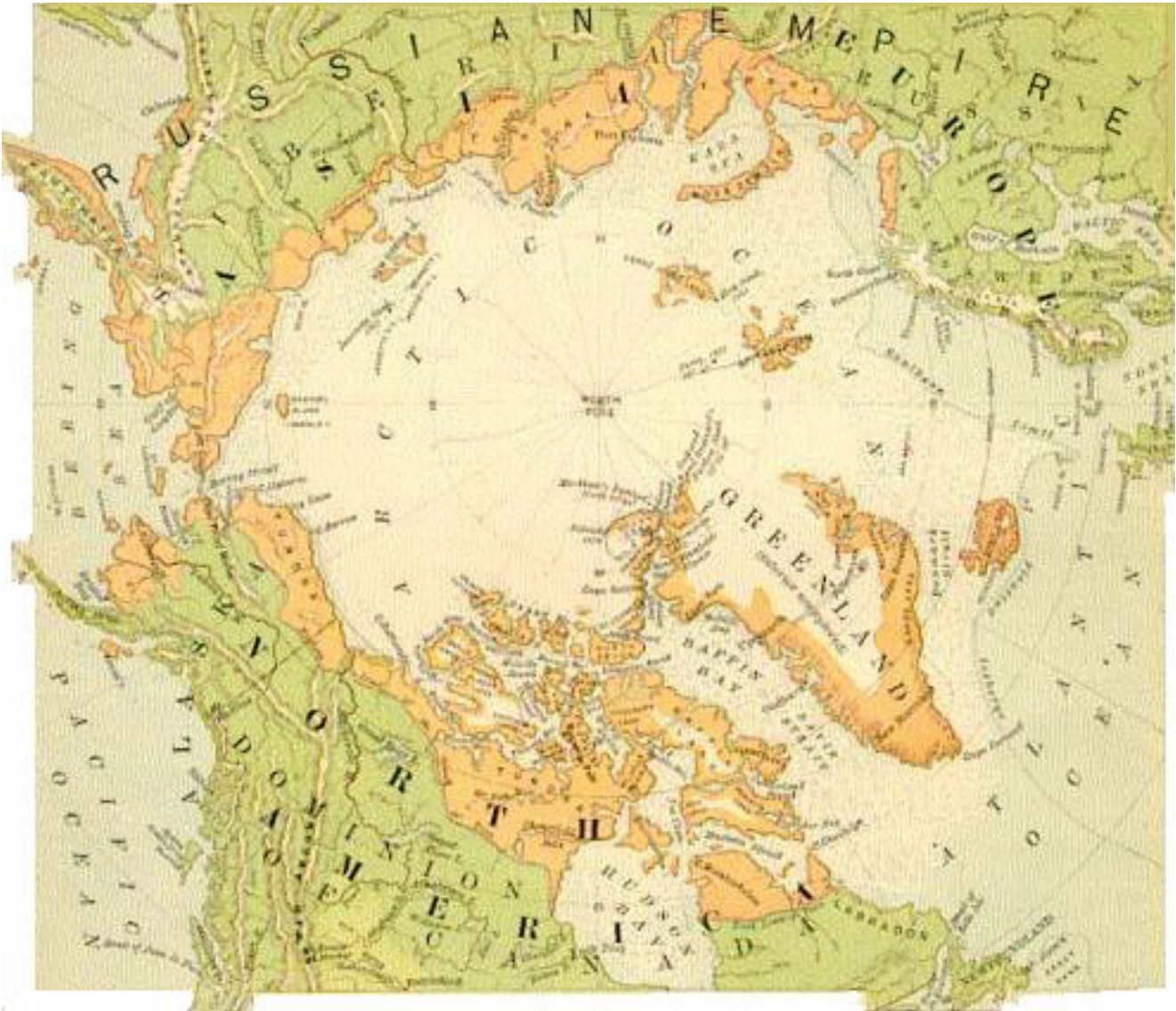
EDMOND HALLEY

ASTRONOMY

ASTRONOMY

October 3: Still coming down from the star that marks the North Pole, [Halley's Comet](#) passed through the bowl of the Big Dipper. It is recorded in European and Asian sources. This is what Earth looked like from the comet (sort of):

SKY EVENT



November 10: We calculate that on this date [Halley's Comet](#) was whipping around the [sun](#).

SKY EVENT



ASTRONOMY

ASTRONOMY

1402

March 12: An extremely bright [comet](#) appeared in the heavens. (Despite its brightness, this comet did not come particularly close to us, having passed the orbit of the earth unnoticed on February 19th at a distance of 0.71 astronomical units.)

SKY EVENT

March 19: The [comet](#) that had whipped past the earth was at this point despite its brightness becoming lost in the solar glare.

SKY EVENT

March 21: The [comet](#) whipped around the [sun](#). (Despite its speed, this comet was not a sungrazer.)

SKY EVENT

March 22-29: During this period the [comet](#) that had just whipped around the sun was again visible even during the daytime.

SKY EVENT

ASTRONOMY

ASTRONOMY

1449

During this year and the following one, the path of a [comet](#) across the constellations would be being tracked by Toscanelli:



SKY EVENT

**1456**

June 5, night: Moveable type had been invented a couple years before, but had not been intended to record such transient events as this one. In the camp of the forces of the Ottoman Empire besieging Belgrade, a sentry saw in the sky an apparition “with a long tail like a dragon’s” spanning about 60 degrees of the night sky. It was [Halley’s Comet](#) coming back. Europeans, who had been going “God save us from the Turk!” would be going “God save us from the Comet and the Turk!”

[COMETS](#)
[SKY EVENT](#)

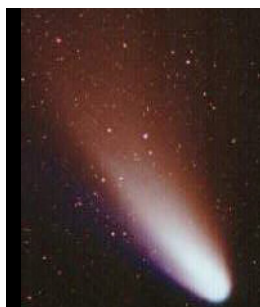
June 9: On this date, we calculate, [Halley’s Comet](#) was whipping around the [sun](#).

[SKY EVENT](#)
[COMETS](#)

June 10-July: A “blazing exhalation” of the upper skies, that we know now as [P/Halley](#), returned right on schedule. A lot of Christians in places such as Vienna noticed, supposing as they would that it would have had something to do with a thingie that was going on at the time that **had** managed **very much** to become an object of fascination: the non-Christian rape of Constantinople.²⁴ On the basis of this observation, Georg von Peurbach (1423-1461) would be the first to attempt to estimate the distance of a [comet](#) from the earth, by the taking of parallax readings.²⁵

[SKY EVENT](#)

24. Meaning no offense, non-Christian in the narrowest sense: rape by non-Christians of Christians. Had it been a natural event such as Christian rape, that is, rape by Christians of non-Christians, they might never have noticed this unnatural light in the sky.
25. His meticulous calculations, however, would later be proven to have been way, way off.



HALLEY'S COMET



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EDMOND HALLEY

1468

Late September: This year there was a bright comet, visible for more than 80 days. As of late September its tail was extending across more than 45 degrees of the sky. One report was that its tail was of a bluish color.

SKY EVENT

1471

Christmas Day: A great comet became apparent on this day, which would become visible even during daylight.

SKY EVENT



ASTRONOMY

ASTRONOMY

1472

January 8: Paolo Toscanelli, the observer who had noted the anti-sunward direction of comet tails, began to track the great [comet](#) that had made its appearance on Christmas Day.

SKY EVENT

Second Week of January: The great [comet](#) which had become visible on Christmas Day was at this point passing through the constellation of Virgo with its tail pointing toward the west. It would pass to a region near the constellation of Arcturus, sweeping the constellation of eastern Coma Berenices. It would arrive in Leo with its tail still pointing toward the west.

SKY EVENT

January 23: On its way in toward the [sun](#), the great [comet](#) of this year passed by the earth at a distance of only 0.07 astronomical units. At this point it was sweeping across our sky at an apparent speed of almost 40 degrees of arc per day.

SKY EVENT

January 24: Observers in [China](#) described the great [comet](#) of this year as possessing as of this day rays that “stretched across the heavens from east to west.” It transited north to Ursa Major and was visible even in the noon sky. During the third week of January, however, observers in [Korea](#) were noting the presence of only 30 degrees of tail, which would suggest that a good deal of the tail may have been so tenuous as to be apparent only under very good conditions of observation.

SKY EVENT

January 28: The last observation of the great [comet](#) of this year recorded by Paolo Toscanelli.

SKY EVENT

February 17: By this point this fast-moving [comet](#) was in the constellations of western Aries and eastern Pisces.

SKY EVENT

Late February: Last sightings of the great [comet](#) of this year.

SKY EVENT

March 1: The [comet](#) passed behind the [sun](#) (it would not be seen at all from Earth on its way out).

SKY EVENT

**1485**

Posthumous completion of publication of [Leon Battista Alberti](#)'s *DE RE AEDIFICATORIA* (TEN BOOKS OF ARCHITECTURE) based upon [Marcus Vitruvius Pollio](#)'s *M. VITRUVII POLLIONIS DE ARCHITECTURA LIBRI DECEM* as *DE RE AEDIFICATORIA*, in Rome by George Herolt, under the superintendence of Fra Giovanni Sulpitius.

Printed in Venice, Sacrobusco's *SPHAERA MUNDI*. Printed by Erhard Ratdolt. Joannes de Sacrobusco, (John of Holybush, Hollywood or Halifax), English mathematician and [astronomer](#), was born in Yorkshire, studied at Oxford and then taught at Paris until his death in 1256 A.D. Sphaera Mundi, his most important work, is largely a paraphrase of Ptolemy's *ALMAGEST*. This superficial abridgement enjoyed for several centuries a great reputation, as it represented a return to the more enlightened cosmogony of the Greeks – in which the earth was a stationary globe around which were revolving in circles and epicycles, the sun, the planets, and stars, while the contemporary writers held that the earth was a circular plane surrounded by water, the heavens resting on pillars like a tent, and the stars carried by appointed angles. This little work of Sacrobusco is divided into four books:

- the sphere of fixed stars
- the circle of the Zodiac
- the length of days in different zones
- the eclipse during the crucifixion was not natural but miraculous

The printer, Erhard Ratdolt, a German, conducted his press in Venice from 1476 to 1486. More than any other printer of the 15th century, he helped to wean the “Cradle books” from the manuscript tradition. Many “1sts” in typography are due to Ratdolt's skill and imagination. In *SPHAERA MUNDI*, he was the 1st to employ a number of colors on a few of the pages. The diagrams were apparently produced not by wood-cuts but, for the 1st time, by means of metal strips embedded in lead. The 1st complete title-page (1476), and the 1st type specimen sheet, are also assigned to this noted German printer. Ratdolt's types are direct descendants of the famous Jenson type and were much admired by William Morris.

1489

At this point the novel arithmetic notations “+” and “-” began their long path toward superceding a confusing scheme which had utilized the “p” (plus) and “m” (minus) letters of the alphabet. This improvement originated in a German book on commercial arithmetic and the original purpose of the new “+” and “-” notation was merely to indicate whether the figure next to it represented a shortage that had been discovered during a warehouse inventory, or a surplus (only the symbols themselves were being introduced at this point, and in fact such notation would not achieve its full modern mathematical significance until 1514).

1492

November 7: Near the small town of Ensisheim in Alsace a large, triangular stone suddenly plummeted from the sky, landing with a great whack in a field of wheat:



When townspeople arrived at the impact area, the hole in which it lay was a meter deep. This “Thunderstone of Ensisheim” would attract a visit by the Emperor Maximilian, who pronounced that what it meant was that he was going to be successful in his ongoing wars with France and the Turks. Taking no chances, he would order that the stone be secured to the wall of the local church with iron chains. The main mass of this meteorite is now on display in the Regency Palace of Ensisheim.²⁶

SKY EVENT

1497

March 9, day: [Nicolas Copernicus](#) and Domenico Maria (an early critic of the accuracy of Claudius Ptolameus’s *LIBER GEOGRAPHIA*), in Bologna, observed as the moon occulted the star Aldebaran.



ASTRONOMY

²⁶. My paternal grandfather observed such an event, the main differences being that this meteorite landed in Illinois rather than in Alsace, that it landed late in the 19th Century rather than late in the 15th Century, that it landed in a field of corn rather than a field of wheat, and that the University of Illinois got involved rather than the Holy Roman Emperor. He told me that when the farmhands dug down to it in the bottom of the pit it had made in the muck of the cornfield, the muck was still steaming and it was warm to the touch.

1499

August 23: Amerigo Vespucci developed a complicated calculational method by which a mariner might establish his ship's [longitude](#) on a clear, calm night, to within two degrees, using nothing more than his [astrolabe](#), the moon



and Mars and the stars, a book of astronomical tables, a great deal of patience, and his own reckoning. If the mariner had the time and the intelligence and the resources, he could do far better by this calculational method than by any method of dead reckoning. By use of this method Vespucci was able to determine that Christopher Columbus was incorrect –that this shore was not somewhere in the East Indies –that indeed this shore was positioned so that it had to be the shore of an entire different and unknown continent. This plus the crossing of the Isthmus of Panama would bring the end of the notion that there was but one major ocean, the Ocean Sea.

1504

February 29: Christopher Columbus, stranded by shipworms on the island of Jamaica, enabled his people in their abuse of the natives — consulting his Regiomontanus [almanac](#) to obtain the date of the next partial lunar eclipse, he demonstrated for the amazement of these locals that white men possessed a power to produce, and then dispel, a supernatural darkness of the moon.²⁷

ASTRONOMY

27. I find it difficult to believe that this actually happened, or if it did happen, that it was anywhere near as simple a matter as here recounted. For one thing, this Regiomontanus almanac was of course one that had been prepared for Europe, by someone who had no information about the longitudes and latitudes of the American continents.

1505

Scipione del Ferro, [Italian](#) mathematician, solved a form of cubic equation.

1507

The Chapter of [Nicolas Copernicus](#) sent him to be private physician to the Bishop. He worked on his *COMMENTARIOLUS*, in which he would which present theories of the motions of celestial bodies (this included the 1st synopsis of his heliocentric theory). He would distribute his treatise to various persons by way of a series of letters.

ASTRONOMY

1512

[Nicolas Copernicus](#) and the other members of the Chapter of Frombork swore allegiance to King Sigismundus I of Poland. For this year and the following one he would be reappointed as Chancellor of the Chapter. In *COMMENTARIOLUS*, he acknowledged that Aristarchus had been correct some two millennia earlier, in inferring that the earth and the other planets turn around the sun, and that the Arab astronomer Ibn al-Shatir had likewise been correct in his theory of planetary motion five generations before Copernicus was born (it is, of course, a signal mark of genius, this ability to admit that someone else is right).



(This, therefore, seems the appropriate place at which to insert some interesting material about the Copernican model of the sun-centered solar system.)



ASTRONOMY

ASTRONOMY

In case you hadn't noticed, there's a mistake about the history of astronomy embedded in the "Friday" chapter of Thoreau's of [A WEEK ON THE CONCORD AND MERRIMACK RIVERS](#):

[A WEEK](#): The anecdotes of modern astronomy affect me in the same way as do those faint revelations of the Real which are vouchsafed to men from time to time, or rather from eternity to eternity. When I remember the history of that faint light in our firmament, which we call Venus, which ancient men regarded, and which most modern men still regard, as a bright spark attached to a hollow sphere revolving about our earth, but which we have discovered to be **another world**, in itself, – how Copernicus, reasoning long and patiently about the matter, predicted confidently concerning it, before yet the telescope had been invented, that if ever men came to see it more clearly than they did then, they would discover that it had phases like our moon, and that within a century after his death the telescope was invented, and that prediction verified, by Galileo, – I am not without hope that we may, even here and now obtain some accurate information concerning that OTHER WORLD which the instinct of mankind has so long predicted. Indeed, all that we call science, as well as all that we call poetry, is a particle of such information, accurate as far as it goes, though it be but to the confines of the truth. If we can reason so accurately, and with such wonderful confirmation of our reasoning, respecting so-called material objects and events infinitely removed beyond the range of our natural vision, so that the mind hesitates to trust its calculations even when they are confirmed by observation, why may not our speculations penetrate as far into the immaterial starry system, of which the former is but the outward and visible type? Surely, we are provided with senses as well fitted to penetrate the spaces of the real, the substantial, the eternal, as these outward are to penetrate the material universe. Veias, Menu, Zoroaster, Socrates, Christ, Shakespeare, Swedenborg, – these are some of our astronomers.

ASTRONOMY

NICOLAS COPERNICUS

What Thoreau was passing along here was during his lifetime a familiar urban legend. According to this received anecdote which Thoreau was unwittingly passing along, Nicolas Copernicus had been confronted over his theory of a heliocentric solar system by a defender of the received Ptolemaic earth-centered system, with the challenge that were his new and novel theory correct (which of course it was not), then planets such as Venus ought to be exhibiting phases similar to that of our moon (which of course they do not). Copernicus supposedly responded to this straight man that we were probably going to find out eventually that planets such as Venus **do** exhibit phases similar to that of our moon:



Venus, April 25, 2004



Venus, May 12, 2004

(Photographed through a Galilean telescope)

This is the sort of urban legend that starts with a famous name and celebrates it for its righteousness, by way of contrast with some anonymous boob who is insisting on an outmoded and false piece of received wisdom. The mere recounting of such a supposed snippet of antique conversation is adequate to reinforce us in our feelings of modernity and of righteous superiority.

In other words, there's a payoff. We get an ego boost for being willing to believe that this urban-legend conversation actually happened: we're so bleeding correct that we're right up there in the Hall of Fame with this Mr. Smart-Guy-Who-Originally-Figured-It-All-Out Copernicus!

However, suspiciously, this anecdote about Saint Nick's alleged conversation is one that somehow had failed to surface in the literature, until the 1st part of our 18th Century. The 1st record we have of it is in Professor John Keill's *AN INTRODUCTION TO THE TRUE ASTRONOMY...*,²⁸ published and republished in the early years of the century, and then also specifically in 1738, in Robert Smith's *A COMPLEAT SYSTEM OF OPTICKS...*²⁹ Neither author was able to cite, exactly how they had come up with this nice-sounding story. That is, on the simple basis of a suspicious lapse of time this probably is an unsubstantiated fabrication. Copernicus had by the 18th Century been dead for lo these many years. How then were these two historical writers, after such a lapse of generations, able to collect a nice anecdote not previously of record? –No, somebody has made this one up, has made it up out of whole cloth. It is one of those just-so fabulations that are too good not to be true. That the Copernicus anecdote does not hold water, however, can be seen not only on grounds of lack of historical evidence but on theoretical grounds as well. If we consider that regardless of whether we are thinking in terms of the Ptolemaic earth-centric solar system, or of the Copernican sun-centric solar system, if the planets are reflecting their illumination from the sun then from the point of view of the earth they **are** going to be displaying phases, in a manner similar to the manner in which our moon displays phases. Irregardless. (The phases of the planets may or may not be visible with a given power of primitive telescope, but they will nevertheless be occurring. Their phases will be somewhat different, if the sun is in orbit about the earth or is

28. Professor John Keill had published his lectures originally in 1718, as *INTRODUCTIO AD VERAM ASTRONOMIAM, SEU LECTIONES ASTRONOMICAE*. This had been republished in English translation in 1721, the year of his death, with emendations, as *AN INTRODUCTION TO THE TRUE ASTRONOMY; OR, ASTRONOMICAL LECTURES, READ IN THE ASTRONOMICAL SCHOOL OF THE UNIVERSITY OF OXFORD*. I do not know whether the spurious anecdote is new to the 2d English edition, published in 1730, or was already present in the 1st English edition published in 1721, or was already present in the Latin original edition of 1718.

29. Robert Smith. *A COMPLEAT SYSTEM OF OPTICKS IN FOUR BOOKS, VIZ. A POPULAR, A MATHEMATICAL, A MECHANICAL, AND A PHILOSOPHICAL TREATISE. TO WHICH ARE ADDED REMARKS UPON THE WHOLE*. Cambridge, 1738, two volumes.



ASTRONOMY

ASTRONOMY

at the center of the solar system, providing a test of whether it is the Ptolemaic system or the Copernican system that is correct.) It is almost as if Copernicus were being portrayed as having been a person who had failed to comprehend the Ptolemaic system — nope, if there is anybody who could be said to for certain sure have had an excellent grasp of precisely what the Ptolemaic system amounted to, this would had had to have been originally Ptolemy, and finally Copernicus!

There is another way to establish that this anecdote is a spurious one. Ask yourself, in what year of what century did we first learn that the planets are dark bodies, that emit no light, shining only in the reflected light of the sun — that they are like our moon (we've known since the time of Anaxagoras that moonlight is reflected sunlight), rather than like the self-radiant stars? I don't know the precise year in which we learned this fact about the solar system, but for sure, it was after the death of Copernicus. Kepler, for instance, believed that the planets were glowing of their own light. Nicolas Copernicus was probably like every other astronomer of his day, in presuming that Venus and the other planets were glowing in the night sky of their own radiance, rather than reflecting the light of the sun. It was considerably later that the planets were put into the same category as our moon, as dark bodies.

The John Keill/Robert Smith anecdote above really didn't last all that long. By midcentury, specifically by 1748, Thomas Rutherford, in his *A SYSTEM OF NATURAL PHILOSOPHY, BEING A COURSE OF LECTURES ... WHICH ARE READ IN ST. JOHN'S COLLEGE CAMBRIDGE*, had pointed up the spurious nature of this anecdote.³⁰ By the time Thoreau heard and recorded this urban legend, it had been being dismissed as a false record by our astronomers for a full century.

1513

Pope Julius II died and Giovanni di Lorenzo de' Medici of Florence became Pope Leo X. The House of Fugger secured an exclusive concession to vend papal indulgences north of the Alps, in [Germany](#).

Correggio discovered chiaroscuro.

Niccolò Machiavelli wrote the [Italian](#) comedy *LA MANDRAGOLA*.

[Michelangelo](#) began the three-year project of carving his "Moses."

In response to an appeal by the Lateran Council, [Nicolas Copernicus](#) compiled a proposal for the reform of the calendar and sent it to [Rome](#).

ASTRONOMY

30. Cf. page 782 of his Volume II: "it is very strange that a defender of Ptolemy's system should make such an objection as this to Copernicus's system, and not less strange that Copernicus should make this answer."



ASTRONOMY

ASTRONOMY

1514

From this point until 1516, the Frombork Chapter relieved [Nicolas Copernicus](#) of his administrative duties. He purchased a house convenient for his sky observations and had a platform added to its back to support his astronomical instruments.

ASTRONOMY

At the age of 30, in addition to his university professorship, the Reverend [Martin Luder](#) became the [Catholic](#) priest for Wittenberg's city church of St. Mary, named for Mary Magdalene, the *Stadtkirche St. Marien*.

[Catherine of Aragón](#), Queen Consort of England and wife of [King Henry VIII](#), again miscarried.

**1518**

[Nicolas Copernicus](#) carried out 16 rural inspections. After a hiatus of a number of years, he resumed his observations of the motions of the planets.

ASTRONOMY

1500 Maximilian divides the empire of Germany into six circles, and adds four more in 1512.
1505 Shillings first coined in England.
1509 Gardening introduced into England from the Netherlands, from whence vegetables were imported hitherto.
1513 The battle of Flodden, in which James IV. of Scotland is killed, with the flower of his nobility.
1517 Martin Luther began the reformation.
Egypt is conquered by the Turks.
1518 Magellan, in the service of Spain, first discovers the straits of that name in South America.
1520 Henry VIII. for his writings in favour of popery, receives the title of Defender of the Faith from his Holiness.
1529 The name of Protestant takes its rise from the reformed protesting against the church of Rome, at the Diet of Spires in Germany.
1534 The reformation takes place in England under Henry VIII.
1537 Religious houses dissolved by ditto.
1539 The first English edition of the Bible authorized; the present translation finished 1611.
About this time cannon began to be used in ships.
1543 Silk stockings first worn by the French king; first worn in England by queen Elizabeth, 1561; the steel frame for weaving invented by the Rev. Mr. Lee, of St. John's College, Cambridge, 1589.
Pins first used in England, before which time the ladies used skewers.
1544 Good lands let in England at one shilling per acre.
1545 The famous council of Trent begins, and continues 18 years.
1546 First law in England, establishing the interest of money at ten per cent.
1549 Lord Lieutenants of counties instituted in England.
1550 Horse guards instituted in England.
1555 The Russian Company established in England.
1558 Queen Elizabeth begins her reign.
1560 The reformation in Scotland completed by John Knox.

1524

[Nicolas Copernicus](#)'s *DE OCTAVA SPHOAERA* (a treatise addressed to Bernard Wapowski, Canon of the Church at Kraków and Secretary to the King of Poland) invalidated the calculations of what was known as the "Motion of the Eighth Sphere," done by an astronomer-wannabee of Nürnberg, Joannes Werner. He was reappointed as chancellor of his Chapter and as envoy of his Chapter.

ASTRONOMY

ASTRONOMY

ASTRONOMY

February 1: During the previous June, some astrologers in London had been prophesying that the End Of The World would come on this day in the Julian calendar — it was to be brought about by a flood — the flood would be starting in London. A clergyman had therefore built a fortress stockpiled with food and water and some 20,000 people had filled it. On this day in London, however, it wouldn't so much as rain (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 236-237).

MILLENNIALISM

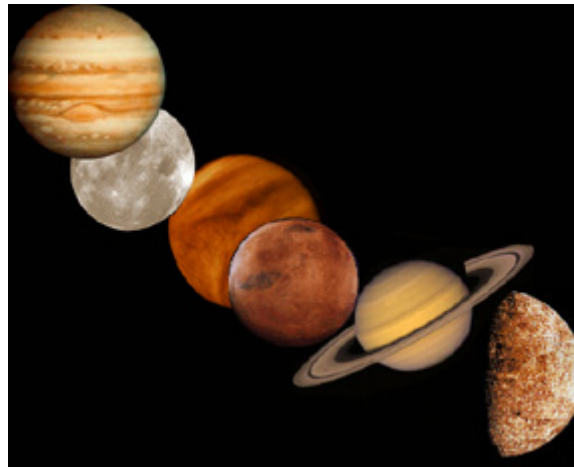


"The nice thing about apocalyptic panics is that all you need for a feel-good moment is the earth not coming to an end."

— [Gail Collins, March 15, 2013](#).

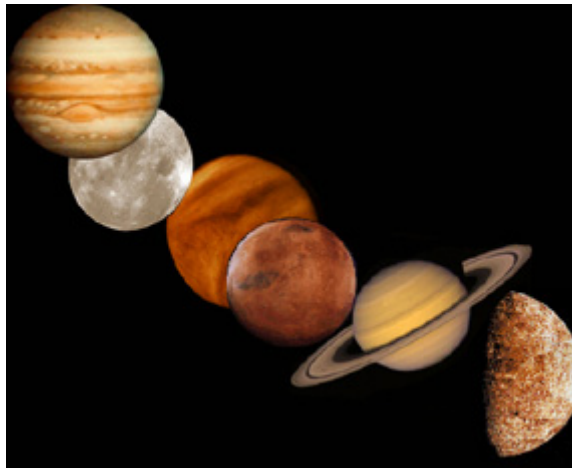


February 20: The astrologer Johannes Stoeffler had regarded a planetary alignment in Pisces as a sign of the [millennium](#), with the world to be destroyed —since Pisces is a water sign— by a flood (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 236-237).



1528

The astrologer Johannes Stoeffler, who had regarded a planetary alignment in Pisces as a sign of the [millennium](#), with the world to be destroyed, since Pisces is a water sign, by a flood on February 20, 1524 CE in the Julian calendar, when that prognosis had failed, had recalculated [Doomsday](#) to occur during this year (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 238).



1530

Regnier Gemma Frisius proposed that [longitude](#) be found by means of a difference of times. Hey, sharp idea!

1531

August 26, Wednesday: A “blazing exhalation” of the upper skies, that we know now as P/Halley, returned right on schedule to whip around the sun, but who would have known there was something special about this one, not shared by the other two spectacular comets that would appear during this year — that it was periodic! On this trip into the solar system, the [comet](#)’s trajectory had been being carefully tracked and recorded by Peter Apian. These measurements would eventually be of assistance to [Edmond Halley](#). Apian would be noticing a curious fact: rather than generally following after the comet in its movement, the tail of the comet was pointing generally away from the sun even where this meant that its tail was generally wafting out ahead of it in its flight. Herr Professor [Martin Luther](#), who saw this comet, explained that such a body was “a star that runs and won’t keep still at its post like a planet, a whoreson among planets ... like a heretic, who thinks he alone knows it all.” One claim made for the comet on this return was that it caused an earthquake in [Germany](#). A claim was



made that when disorders brought by a comet, the end of such a period of disorder would be announced by a rainbow. From a comet catalog of this century:

ASTRONOMY

*Anno 1531, 1532, 1533 comets were seen and at that time
Satan hatched heretics.*



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



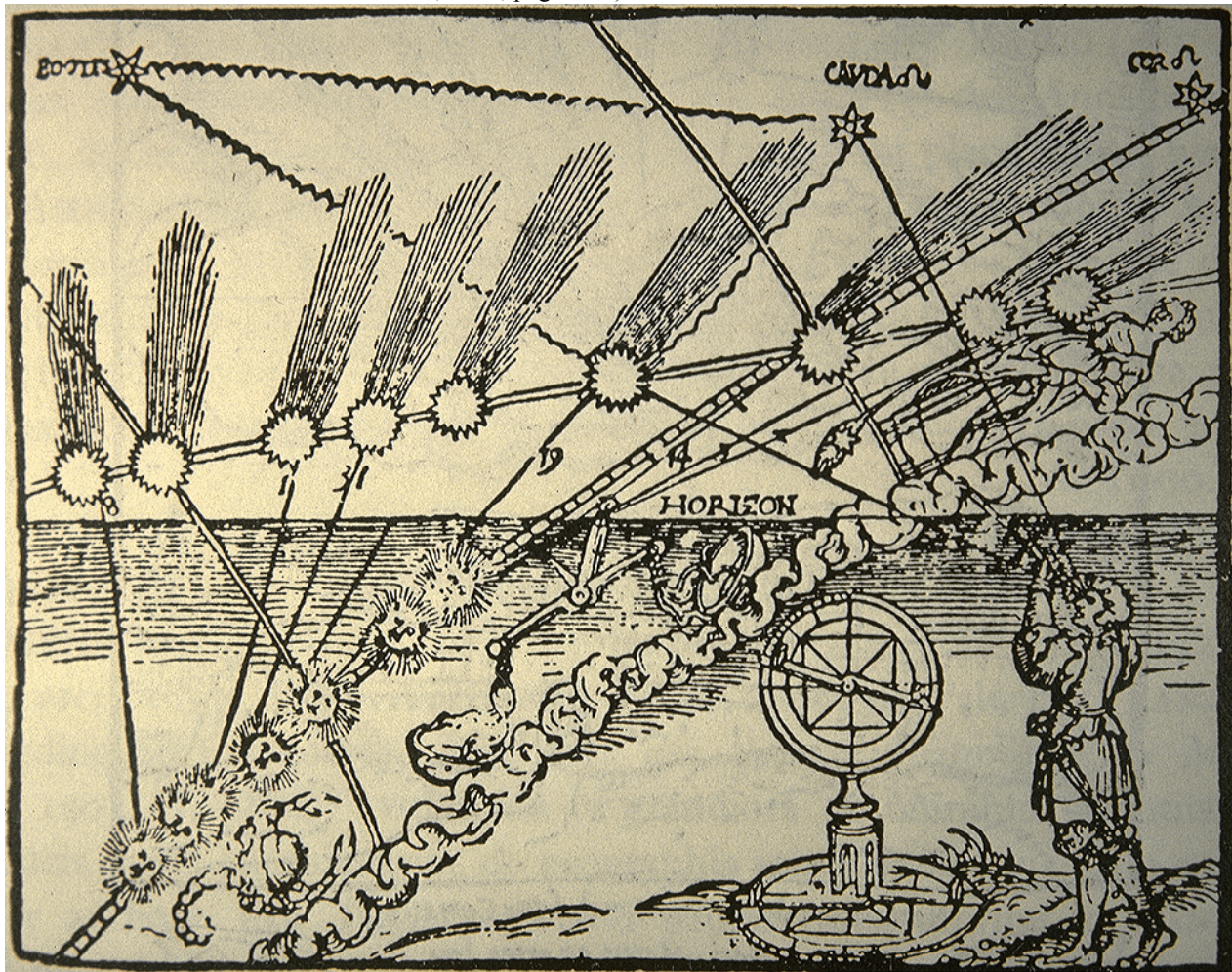
EDMOND HALLEY

1532

ASTRONOMY

ASTRONOMY

There was a 2d very bright [comet](#), like the year before, and this one would be visible for 119 days. It would be observed to pass from the constellation of southern Gemini through Leo, then Virgo, then Libra. Bishop Frederick Nausea of Vienna, hearing reports of bizarre occurrences including bloody crosses appearing in the sky alongside a comet, had convinced himself that the world was very soon going to come to an end. He anticipated that it would be either in this year or afterward (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 238).³¹



MILLENNIALISM

31. By the way (I'll insert this material here, for lack of a better place): The Leonid meteor showers, which had been occurring in mid-October during the 10th Century, during this 16th Century were not occurring until late October. (In our own florut, they are now occurring at mid-November.)

1533

Late June-Early September: There was yet another bright [comet](#), as in the previous year and in the year before that. This one was visible for 80 days, as it appeared to transit from the constellation of northern Auriga through Perseus and western Cassiopeia, into Cygnus. [Nicolas Copernicus](#) would get a chance to see this one.

SKY EVENT



1539

Georg Joachim von Lauchen, AKA Rheticus, professor of mathematics at Wittenberg, visited [Nicolas Copernicus](#) to learn more about his theory and to assist in publication of the manuscript that would be *DE REVOLUTIONIBUS ORBIUM COELESTIUM*.

ASTRONOMY



ASTRONOMY

ASTRONOMY

1541

[Michelangelo](#) finished The Last Judgment, the largest fresco of the Renaissance. Christ, with a clap of thunder, puts into motion the inevitable separation, with the saved ascending on the left side of the painting and the damned descending on the right into a Dantesque hell. As was his custom, Michelangelo portrayed all the figures nude, but prudish draperies were added by another artist (who was dubbed the “breeches-maker”) a decade later, as the cultural climate became more conservative. Michelangelo painted his own image in the flayed skin of St. Bartholomew.

After many revisions, [Nicolas Copernicus](#) delivered to Georg Joachim von Lauchen, AKA Rheticus, professor of mathematics at Wittenberg, for publication, the manuscript of his *DE REVOLUTIONIBUS ORBIUM COELESTIUM*.

ASTRONOMY

1542

[Nicolas Copernicus](#)’s book on trigonometry, an extract from certain chapters of his *DE REVOLUTIONIBUS ORBIUM COELESTIUM*, was published at Wittenberg.

ASTRONOMY

1543

The *DE REVOLUTIONIBUS ORBIUM COELESTIUM* of [Nicolas Copernicus](#) was published at Nürnberg.

ASTRONOMY



Be it noted, the theory by Mikolaj Kopernic about the planets revolving around the sun instead of the earth was being published only posthumously. Also, so that the Polish astrologer's insight would seem more fresh



ASTRONOMY

ASTRONOMY

than actually it was, his students had carefully elided from this text any mention of predecessors — such as Hellenistic models of heliocentric solar systems dating to the 2d century BCE.

1556



End of February: A [comet](#) was seen in the constellation of Corvus, passing just to the southwest of the star Spica. As it passed by the earth at a distance of 0.08 astronomical units it would appear to be traveling toward the northeast through the constellations of Bootes and Draco. Although it seems not to have had an extraordinarily long tail, it was extremely bright and was described not only as “prodigious” and “extraordinary” but also as “terrifying” — well, of course, terrifying is in the eye of the beholder. As it would move on toward the [sun](#) it would appear to pass through Cassiopeia and Andromeda into eastern Pegasus. On April 22d it would whip around the sun and on May 10th it would be glimpsed for the last time.

SKY EVENT

1572

November 6, Monday: The attention of W. Schuler was attracted to an object which was shining at about the brightness of the planet Jupiter, in the constellation of Cassiopeia where there had previously been no such thing. He was observing a “new star” (it has been named B Cassiopeiae, or Nova Cassiopeiae 1572), one of the few [supernovae](#) we have been able to observe within our own Milky Way Galaxy.

SKY EVENT

ASTRONOMY

ASTRONOMY

November 11, Saturday: While [Tycho Brahe](#) was on his way home on this evening, his attention was attracted by a bright new star which was shining in Cassiopeia:



At its brightest, this Nova Stella became visible to the naked eye even by day. By measurements of its position, Brahe would be able to demonstrate that this was no mere nearby object, no comet for instance within our local solar system, but instead at a great distance, among the stars. This constituted undisputable evidence that the stars, which had the reputation of being unchangeable in contrast with this realm of mud and confusion here below, were in fact just as changeable as anything we can more closely observe:

On the 11th day of November in the evening after sunset, I was contemplating the stars in a clear sky. I noticed that a new and unusual star, surpassing the other stars in brilliancy, was shining almost directly above my head; and since I had, from boyhood, known all the stars of the heavens perfectly, it was quite evident to me that there had never been any star in that place of the sky, even the smallest, to say nothing of a star so conspicuous and bright as this. I was so astonished of this sight that I was not ashamed to doubt the trustworthiness of my own eyes. But when I observed that others, on having the place pointed out to them, could see that there was really a star there, I had no further doubts. A miracle indeed, one that has never been previously seen before our time, in any age since the beginning of the world.

SKY EVENT



ASTRONOMY

ASTRONOMY

Brahe was so impressed that he would devote the remainder of his short professional life to astronomy only. The apparition would soon come to rival Venus in brightness. For about two weeks the star would be visible even in daylight. At the end of November it would begin to fade and change color, from bright white over yellow and orange to faint red, until finally it would fade from visibility to the naked eye during March 1574. (The faint nebulosity of the gas shell that is the remnant of this supernova would be discovered on photo plates exposed under the Mt. Palomar telescope during the 1960s, and identified by their radio emissions. No stellar remnant has to date been identified. The radio source is catalogued as 3C 10, at location G 120.1+1.4. The gas shell is expanding at about 9,000 kilometers per second, which is very fast compared with the Crab Nebula, which is expanding only at about 1,000 kilometers per second, and has now achieved an apparent diameter of 3.7 arc minutes.)

November 24, Friday: [John Knox](#) died in Edinburgh, Scotland. The new bright white star B Cassiopeiae was beginning its fade into redness.

AS IT APPEARED LAST NIGHT

SKY EVENT

1577

November 13, Sunday evening: [Tycho Brahe](#) was out catching some fish for his supper when he noticed, in the vicinity of the setting sun, a bright object that should not be there. As darkness fell, it became evident first that this was a [comet](#) and that its head was of the brightness of the planet Venus, and then that its tail stretched at least 20 degrees across the sky. The coma of the comet Brahe would establish as being eight arc-minutes in diameter, and the tail he would measure, at its fullness, as 22 degrees in length. This one has become famous as [the 1st comet to have been understood to have been farther away from us than the moon](#). Clearly, with comets farther away than the moon, Aristotle had been mistaken when he had discounted them as mere atmospheric phenomena!



The perihelion of this comet, its passage around the sun, would occur on October 27th.

SKY EVENT

It had been first glimpsed on November 1st, from Peru, where it had been observed to be shining through the

ASTRONOMY

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clouds as if it were another moon. It had been glimpsed also from London, and its tail was estimated from that location to have reached seven and a half degrees in extent. It had been seen from [Japan](#), to the southwest after sunset, on November 8th, with its tail was reaching almost halfway across the sky. The Japanese likewise considered the comet to be “bright as the moon.” On November 14, in China, a tail of some 50 degrees was alleged. This comet would be visible to the naked eye for almost three months.

Queen Elizabeth supposedly viewed this comet despite warnings that looking at it might bring bad luck. Supposedly, as she stepped back indoors, she remarked “*Lacta est alea*,” “the die is cast.”



From a hilltop in Weil, 5-year-old [Johannes Kepler](#) and his mother glimpsed the same show. To make sure he would remember the event, Johannes’ father held him up to the sky.



1578

January 26, Thursday: [Tycho Brahe](#) got one last glimpse of the great [comet](#) of the previous year.



ASTRONOMY

1582

October: Because Caesar's [calendar](#) (that is, the "Julian" calendar) was still several minutes longer than the [solar](#) year, to keep Easter aligned with the spring equinox Pope Gregory XIII reduced this year's October by 10 days. – Hence the "Gregorian" calendar, which still remains not quite accurate since it runs 26 seconds long per year (while Jesuits would introduce the new calendar into [China](#) and [Japan](#) during the following year, its innovative leap years would not be well adopted in Protestant European countries until the 18th Century).

The new "Gregorian" [calendar](#) sponsored among Catholics by Pope Gregory XIII replaced the "Annunciation Celebration, March 25th" convention for New Year's Day with the "Circumcision Celebration, January 1st" convention (while Jesuits would introduce the new calendar into [China](#) and [Japan](#) during the following year, its designation of January 1st as New Year's Day would not be well adopted in Protestant European countries until the 18th Century).

Various Year-End Conventions

Indictio graeca end-of-year convention: The calendar year extended from September 1st of the previous to August 31st of the given year. Conventional in Byzance, South Italy, and Sicily, and until 1087 by the Papal *curia*.

Indictio romana convention: The calendar year began with New Year's day, here either A) December 25th of the previous or B) January 1st of the given year. This calendar convention was used by the Papal *curia* from 1087 on and in late medieval Germany.

Indictio Bedana Convention: The calendar year extended from September 24th of the previous to September 23d of the given year. Introduced by the Venerable Bede, later widely used, especially in Germany and by the Imperial chancellery.

Byzantine Convention: The calendar year extended from September 1st of the previous to August 31st of the given year in accordance with the Byzantine usage of dating the creation of the world.



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Christmas Convention: The calendar year extended from December 25th of the previous to December 24th of the given year (the convention most widely used in the Middle Ages).

Circumcision Convention: The calendar year extends from January 1st to December 31st, as is the convention here today.

Annunciation Convention: The calendar year began with March 25th of the previous (*stilus pisanus*) or on March 25th of the given year (*stilus florentinus*, *mos anglicanus*).

Venezian Convention: The calendar year extended from March 1st of the given year to the last day of February of the subsequent year. This convention derived from the pre-Caesarian Roman convention used by the Merovingian Franks, and was the official convention in Venice until 1797.

Easter Convention: The calendar year began on the (movable) date of Easter Sunday of the given year. The Easter Convention year went from Easter Sunday (our convention) to Holy Saturday (our convention). Easter Convention was used especially in France until the 16th century (*mos gallicus*). This program calculates Easter only for the time after the Council of Nicea (325CE), assuming that Easter was the first Sunday after the first official full moon on or after the official vernal equinox (March 21st). Easter dates from 1583 on are given according to the Gregorian calendar reform of October 15, 1582, and are calculated with the official full moon. However, not all countries immediately adopted the Gregorian calendar, and some Protestant nations temporarily based their Easter computation on the actual rather than the “official” full moon.

February 24: Pope Gregory XIII issued the Papal Bull outlining [calendar](#) reforms that would come to be known as the “Gregorian Calendar.”

December 20: The Gregorian [Calendar](#) was introduced in France.³²

32. Actually, it is a Eurocentrist oversimplification to suppose that before this point in time the old year had been considered to end and a new one to begin at a point in March, whereas after this point in time an old year ended and a new year began at the stroke of midnight on December 31st. In actuality, different cultures of the globe have followed very different conventions. Here is the webpage to use to convert dating formulas with kalends, nones, and ides and to verify weekdays and various indiction conventions (Greek Convention, Roman Convention, Bedan Convention) and New Year conventions (Byzantine Convention, Christmas Convention, Pisan and Florentine Annunciation Convention, Venezian Convention, Easter Convention):

<http://www.lieberknecht.de/~prg/calendar.htm>

The information presently available is limited to the Christian era (Julian calendar until October 4, 1582, Gregorian calendar afterwards, Easter dates from 326CE on). You can also consult a Medieval Calendar Calculator website which produces tables of months, years and sundays for the time 500CE-1582, including fixed and movable feasts and offering a template for customizing these tables according to your specific needs:

<http://www.execulink.com/~edwall/calendar/mcc.htm>

1583

April 28, high noon: The astrologer Richard Harvey had predicted that the [Second Coming](#) of Jesus Christ would take place, at noon on this day, because there was to be a conjunction of Jupiter and Saturn. A number of London astrologers were predicting the end of the world (Skinner, Stephen. *MILLENNIUM PROPHECIES*. Stamford CT: Longmeadow Press, 1994, page 27, Weber, Eugen. *APOCALYPSES*. Cambridge MA: Harvard UP, 1999, page 93).



MILLENNIALISM



ASTRONOMY

ASTRONOMY

1587



The perennial popular perception, that [Halley's Comet](#) defeated the Spanish Armada (courtesy of God, who is on England's side in a major way), is an evident confusion of this well-known periodic [comet](#) with the Great Comet of 1577 (which of itself was about a decade too early to have been of any great nautical assistance).

ASTRONOMY

1589

A news item relating to the development of ELECTRIC WALDEN technology:

- Giambattista della Porta found that he could improve the image produced by an artist's *camera obscura* by slightly enlarging its tiny aperture, and placing a lens over it.

When the images of illuminated objects pass through a small round hole into a very dark room ... you will see on the paper all those objects in their natural shapes and colors. They will be reduced in size, and upside down.

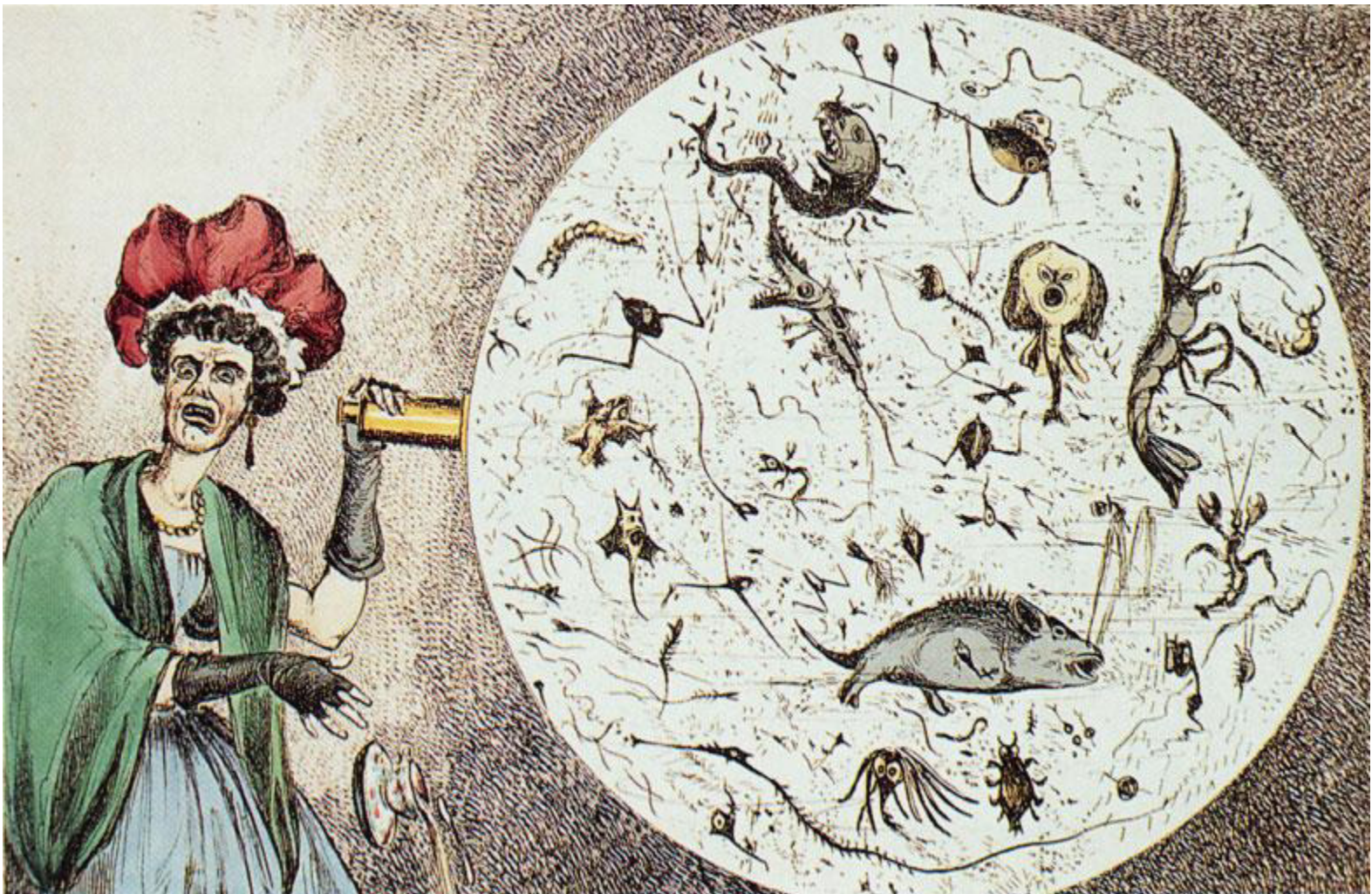
— Leonardo da Vinci

ASTRONOMY

ASTRONOMY

1590

At about this point, Zacharius Jensen of the Netherlands constructed a compound microscope with a converging objective lens and a diverging eye lens.
This 1st microscope left a lot to the imagination:

HISTORY OF OPTICS



1601

Philemon Holland provided a translation of [C. Plinius Secundus](#)'s NATURAL HISTORY dating to the year 77 CE, using as his English title THE HISTORIE OF THE WORLD:

PLINY

Book I.

**THE INVENTORIE OR INDEX,
CONTAINING THE CONTENTS OF XXXVII BOOKES,
TOVCHING THE HISTORIE OF NATVRE,
WRITTEN BY C. PLINIVS SECVNDVS, WHICH IS RECEI-
VED FOR THE FIRST BOOKS OF THEM.**

The Summarie of every Booke.

The first Booke containeth the Dedicatorie Epistle or Preface of the worke, addressed to Titus Vespasian the Emperour. Also the names of the Authors out of which he gathered the Historie, which he prosecuteth in 36 Bookes: together with the Summarie of every Chapter: & beginneth, The Books, &c.

The second, treateth of the World, Elements, and Starres, and beginneth thus, The world, &c.

The third, describeth the first and second gulfe, which the Mediterranean sea maketh in Europe: and beginneth in this manner, Hitherto, &c.

The fourth, compriseth the third gulfe of Europe, beginning, The third, &c.

The fift, containeth the description of Affrick, and beginneth thus, Africk, &c.

The sixt, handleth the Cosmographie of Asia, beginning thus, The sea called, &c.

The seventh treateth of man, and his inventions, beginning, Thus as you see, &c.

The eight sheweth unto us, land creatures, and their kinds, and beginneth after this manner, Passe we now, &c.

The ninth, laieth before us all fishes, and creatures of the water, beginning in this wise, I have thus showed, &c.

The tenth speakes of flying fowls and birds, and beginneth thus, It followeth, &c.

The eleventh telleth us of Insects, and beginneth thus, It remaineth now, &c.

The twelfth treateth of drugs & odoriferous plants, beginning, Thus you, &c.

The thirteenth describeth straunge and forreine trees: beginning with these words, Thus far forth, &c.

The fifteenth comprehendeth all fruitfull trees, thus beginning,



There were, &c.

The sixteenth describeth unto us all wild trees, beginning with, Hitherto, &c.

The seventeenth containeth tame trees with hortyards, and beginneth with these words, As touching the nature, &c.

The eighteenth booke treateth of the nature of corne, and all sorts thereof, together with the profession of husbandmen, and agriculture, beginning after this manner, Now followeth, &c.

The nineteenth discourseth of Flax, Spart, and Gardenage, beginning after this manner, In the former book, &c.

The twentieth sheweth of garden herbs, good to serve both the kitchen for meat, and the Apothecaries shop for medicine, & beginneth thus, Now will we, &c.

The one and twentie treateth of flours & garlands, and beginneth, In Cato, &c.

The two and twentie containeth the chaplets and medecines made of hearbs, with this beginning, Such is the perfection, &c.

The three and twentie sheweth the medicinable vertues of wine, and tame trees growing in hortyards, beginning thus, Thus have we, &c.

The foure and twentie declareth the properties of wild trees serving in physick, beginning, thus, Nature, &c.

The five and twentie treateth of the hearbs in the field comming up of their own accord, and thus beginning, The excellencie, &c.

The six and twentie sheweth of many new and straunge maladies, the medicinable vertues also of certaine hearbs, according to sundrie diseases, beginning thus, The verie face, &c.

The seven and twentie goeth forward to certaine other hearbs and their medecines, and thus beginneth, Certes, &c.

The eight and twentie setteth downe certaine receipts of remedies in physicke, drawne from out of man and other bigger creatures, and it beginneth in this manner, Heretofore, &c.

The nine and twentie treateth of the first authours and inventors of Physicke, also of medecines taken from other creatures, & beginneth, The nature, &c.

The thirtieth booke speaketh of Magicke, and certaine medecines appropriat to the parts and members of mans bodie, beginning thus, The vanitie, &c.

The one and thirtie containeth the medicinable vertues of fishes & water creatures, with this beginning, Now followeth, &c.

The two and thirtie sheweth other properties of fishes, &c. and beginneth in this manner, Now we are come, &c.

The three and thirtie treateth of gold and silver mines, and hath this beginning, Time it is, &c.

The foure and thirtie speaketh of copper and brasse mines, also of lead, also of excellent brasse-founders and workemen in copper, beginning after this manner, In the next place, &c.



The five and thirtie discourseth of painting, colour, and painters, beginning in this sort, The discourse, &c.

The six and thirtie treateth of marble and stone for building, and hath this beginning, It remaineth, &c.

The seven and thirtie concludeth with pretious stones, and beginneth at these words, To the end that, &c.

**IN THE SECOND BOOKE IS CONTAINED
the discourse of the World,
of cœlestiall impressions and meteors,
as also of them that appeare in the Aire,
and upon Earth.**

Chap.

1. Whether the World bee finite and limited within certaine dimensions or no? whether there be many, or but one?
2. The forme and figure of Heaven and the World.
3. The motion of heaven.
4. Why the world is called Mundus?
5. Of the Elements.
6. Of the seven Planets.
7. Concerning God.
8. The nature of fixed starres and planets: their course and revolution.
9. The nature of the Moone.
10. The eclipse of Sun and Moone: also of the night.
11. The bignesse of starrs.
12. Divers inventions of men and their observations touching the cœlestiall bodies.
13. Of Eclipses.
14. The motion of the Moone.
15. Generall rules or canons touching planets or lights.
16. The reason why the same planets seeme higher or lower at sundrie times.
17. Generall rules concerning the planets or wandring stars.
18. What is the cause that planets change their colours?
19. The course of the Sun: his motion: and from whence proceedeth the inequalitye of daies.
20. Why lightnings be assigned to Iupiter.
21. The distances between the planets.
22. The harmonie of stars and planets.
23. The geometrie and dimensions of the world.
24. Of stars appearing sodainly.
25. Of comets or blasing stars, and other prodigious appearances in the skie: their nature, situation, and sundrie kinds.
26. The opinion of Hipparchus the Philosopher as touching the stars, fire-lights, lamps, pillars or beams of fire, burning darts, gapings of the skie, and other such impresions, by way of example.
27. Straunge colours appearing in the firmament.
28. Flames and leams seen in the skie.
29. Circles or guirlands shewing above.
30. Of cœlestiall circles & guirlands that continue not, but soone passe.



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31. Of many Suns.
32. Of many Moons.
33. Of nights as light as day.
34. Of meteors resembling fierie targuets.
35. A straunge and woonderfull apparition in the skie.
36. The extraordinarie shooting and motion of stars.
37. Of the stars named Castor and Pollux.
38. Of the Aire.
39. Of certaine set times and seasons.
40. The power of the Dog-star.
41. The sundrie influences of stars according to the seasons and degrees of the signs.
42. The causes of raine, wind, and clouds.
43. Of thunder and lightning.
44. Whereupon commeth the redoubling of the voice, called Echo.
45. Of winds againe.
46. Divers considerations observed in the nature of winds.
47. Many sorts of winds.
48. Of sodaine blasts and whirle-puffs.
49. Other strange kinds of tempests & storms.
50. In what regions there fall thunderbolts.
51. Divers sorts of lightnings, and wonderous accidents by them occasioned.
52. The observations [of the Tuscanes in old time] as touching lightning.
53. Conjuring for to raise lightning.
54. Generall rules concerning leames and flashes of lightning.
55. What things be exempt and secured from lightning and thunderbolts.
56. Of monstrous and prodigious showres of raine, namely of milke, bloud, flesh, yron, wooll, bricke, and tyle.
57. The rattling of harnesse and armour: the sound also of trumpets heard from heaven.
58. Of stones falling from heaven.
59. Of the Rainbow.
60. Of Haile, Snow, Frost, Mists, and Dew.
61. Of divers formes and shapes represented in clouds.
62. The particular properties of the skie in certaine places.
63. The nature of the Earth.
64. The forme and figure of the earth.
65. Of the Antipodes: and whether there bee any such. Also, as touching the roundesse of the water.
66. How the water resteth upon the earth.
67. Of Seas and rivers navigable.
68. What parts of the earth be habitable.
69. That the earth is in the mids of the world.
70. From whence proceedeth the inequality observed in the rising and elevation of the stars. Of the eclipse: where it is, & wherfore.
71. The reason of the day-light upon earth.
72. A discourse thereof according to the Gnomon: also of the first Sun-dyall.
73. In what places and at what times there are no shadows cast.
74. Where the shadows fall opposite and contrarie twice in the yeare.



75. Where the dayes bee longest, and where shortest.
76. Likewise of Dyals and Quadrants.
77. The divers observations and acceptations of the day.
78. The diversities of regions, and the reason thereof.
79. Of Earthquake.
80. Of the chinks and openings of the earth.
81. Signes of earthquake toward.
82. Remedies and helps against earthquakes comming.
83. Straunge and prodigious wonders seene one time in the earth.
84. Miraculous accidents as touching earth-quake.
85. In what parts the seas went backe.
86. Islands appearing new out of the sea.
87. What Islands have thus shewed, and at what times.
88. Into what lands the seas have broken perforce.
89. What Islands have ben joyned to the continent.
90. What lands have perished by water and become all sea.
91. Of lands that have settled and beene swallowed up
of themselves.
92. What citties have beene overflowed and drowned by the sea.
93. Woonderfull straunge things as touching some lands.
94. Of certaine lands that alwaies suffer earthquake.
95. Of Islands that flote continually.
96. In what countries of the world it never raineth:
also of many miracles as well of the earth as other elements
hudled up pell mell together.
97. The reason of the Sea-tides, as well ebbing as flowing,
and where the sea floweth extraordinarily.
98. Woonderfull things observed in the Sea.
99. The power of the Moone over Sea and land.
100. The power of the Sun: and the reason why the sea is salt.
101. Moreover, as touching the nature of the Moone.
102. Where the sea is deepest.
103. Admirable observations in fresh waters,
as well of fountains as rivers.
104. Admirable things as touching fire and water joyntly
together: also of Maltha.
105. Of Naphtha.
106. Of certaine places that burne continually.
107. Wonders of fire alone.
108. The dimension of the earth as well in length as in breadth.
109. The harmonick circuit & circumference of the world.

In sum, there are in this booke of histories, notable matters,
and worthie observations, foure hundred and eighteene in number.

Latine Authors alledged in this booke.

M. Varro, Sulpitius Gallus, Tiberius Cæsar Emperour, Q. Tubero,
Tullius Tiro, L. Piso, T. Livius, Cornelius Nepos, Statius,
Sebosius, Casius Antipater, Fabianus, Antias, Mutianus, Cecina,
(who wrote of the Tuscan learning) Tarquitius, L. Aquala, and
Sergius Paulus.

Forreine Authours cited.

Plato, Hipparchus, Timæus, Sosigenes, Petosiris, Necepsus, the
Pythagoreans, Posidonius, Anaximander, Epigenes, Gnomonicus,
Euclides, Ceranus the Philosopher, Eudoxus, Democritus,
Crisodemus, Thrasillus, Serapion, Dicæarchus, Archimedes,

Onesicritus, Eratosthenes, Pytheas, [Herodotus](#), Aristotle, Ctesias, Artemidorus the Ephesian, Isidorus Characenus, and Theopompus.

IN THE SEVENTH BOOKE ARE CONTAINED the woonderfull shapes of men in diverse countries.

Chap.

1. The strange formes of many nations.
2. Of the Scythians, and other people of diverse countries.
3. Of monstrous and prodigious births.
4. The transmutation of one sex into another. Also of twins.
5. Of the generation of man.
The time of a womans childbearing, from seven moneths to eleven, proved by notable examples out of hystories.
6. Of conceptions, and children within the wombe.
The signes how to know whether a woman goe with a sonne or a daughter before she is delivered.
7. Of the conception and generation of man.
8. Of Agrippæ, i. those who are borne with the feet forward.
9. Of straunge births, namely, by means of incision, when children are cut out of their mothers wombe.
10. Of Vopisci, i. such as being twins were born alive, notwithstanding the one of them was dead before.
11. Hystories of many children borne at one burden.
12. Examples of those that were like one to another.
13. The cause and manner of generation.
14. More of the same matter and argument.
15. Of womens monthly tearmes.
16. The manner of sundrie births.
17. The proportion of the parts of mans body and notable things therein observed.
18. Examples of extraordinarie shapes.
19. Straunge natures of men.
20. Of bodily strength and swiftnesse.
21. Of excellent sight.
22. Who excelled in hearing.
23. Examples of patience.
24. Who were singular for good memorie.
25. The praise of C. Iulius Cæsar.
26. The commendation of Pompey the Great [Gnaeus Pompeius Magnus].



27. The praise of Cato, the first of that name.
28. Of valour and fortitude.
29. Of notable wits, or the praises of some of their singular wit.
30. Of Plato, Ennius, Virgill, M. Varro, and M. Cicero.
31. Of such as carried a majestie in their behaviour.
32. Of men of great authoritie and reputation.



33. Of certaine divine and heavenly persons.
 34. Of Scipio Nasica.
 35. Of Chastitie.
 36. Of Pietie, and naturall kindnesse.
 37. Of excellent men in diverse sciences, and namely,
in Astrologie, Grammer, and Geometrie, &c.
 38. Item, Rare peeces of worke made by sundry artificers.
 39. Of servants and slaves.
 40. The excellencie of diverse nations.
 41. Of perfect contentment and felicitie.
 42. Examples of the variety and mutabilitie of fortune.
 43. Of those that were twice outlawed and banished:
of L. Sylla and Q. Metellus.
 44. Of another Metellus.
 45. Of the Emperour Augustus.
 46. Of men deemed most happie above all others
by the Oracles of the gods.
 47. Who was cannonized a god whiles hee lived upon the earth.
 48. Of those that lived longer than others.
 49. Of diverse nativities of men.
 50. Many examples of straunge accidents in maladies.
 51. Of the signes of death.
 52. Of those that revived when they were caried forth
to be buried.
 53. Of suddaine death.
 54. Of sepulchres and burials.
 55. Of the soule: of ghosts and spirits.
 56. The first inventors of many things.
 57. Wherein all nations first agreed.
 58. Of antique letters.
 59. The beginning of Barbaras first at Rome.
 60. The first devisers of Dials and Clockes.
- In summe, there are in this booke of stories straunge accidents
and matters memorable 747.

Latine authors.

Verrius Flaccus, Cn. Gellius, Licinius Mutianus, Mutius,
Massurius [Sabinus], Agrippina wife of Claudius, M. Cicero,
Asinius Pollio, Messala, Rufus, Cornelius Nepos, Virgil, Livie,
Cordus, Melissus, Sebosus, Cornelius Celsus, Maximus Valerius,
Trogus, Nigidius Figulus, Pomponius Atticus, Pedianus Asconius,
Sabinus, Cato Censorius, Fabius Vestalis.

Forraine writers.

Herodotus, Aristetas, Beto, Isigonus, Crates, Agatharcides,
Calliphanes, Aristotle, Nymphodorus, Apollonides, Philarchus,
Damon, Megasthenes, Ctesias, Tauron, Eudoxus, Onesicratus,
Clitarchus, Duris, Artemidorus, Hippocrates the Physician,
Asclepiander the Physician, Hesiodus, Anacreon, Theopompus,
Hellanicus, Damasthes, Ephorus, Epigenes, Berosus, Pessiris,
Necepsus, Alexander Polyhistor, Xenophon, Callimachus,
Democritus, Duillius, Polyhistor the Historian, Strabo who wrote
against the Propositions and Theoremes of Ephorus, Heraclides
Ponticus, Asclepiades who wrote Tragodamena, Philostephanus,
Hegesias, Archimachus, Thucydides, Mnesigiton, Xenagoras,
Metrodorus Scepsius, Anticlides, and Critodemus.



**IN THE EIGHTH BOOKE ARE CONTAINED
the natures of land beasts that goe on foot.**

Chap.

1. Of land creatures: The good and commendable parts in Elephants: their capacitie and understanding.
2. When Elephants were first yoked and put to draw.
3. The docilitie of Elephants, and their aptnesse to learne.
4. The clemency of Elephants: that they know their owne daungers. Also of the felnesse of the Tigre.
5. The perceivance and memory of Elephants.
6. When Elephants were first seene in Italie.
7. The combats performed by Elephants.
8. The manner of taking Elephants.
9. The manner how Elephants be tamed.
10. How long an Elephant goeth with young, and of their nature.
11. The countries where Elephants breed: the discord and warre betweene Elephants and Dragons.
12. The industrie & subtile wit of Dragons and Elephants.
13. Of Dragons.
14. Serpents of prodigious bignes: of Serpents named Boæ.
15. Of beasts engendred in Scythia, and the North countries.
16. Of Lions.
17. Of Panthers.
18. The nature of the Tygre: of Camels, and the Pard-Cammell: when it was first seene at Rome.
19. Of the Stag-Wolfe named Chaus: and the Cephus.
20. Of Rhinoceros.
21. Of Onces, Marmosets called Sphinges, of the Crocutes, of common Marmosets, of Indian Boeufes, of Leucrocutes, of Eale, of the Æthyopian Bulls, of the beast Mantichora, of the Licorne or Unicorne, of the Catoblepa, and the Basiliske.
22. Of Wolves.
23. Of Serpents.
24. Of the rat of India called Ichneumon.
25. Of the Crocodile, the Skinke, and the River-horse.
26. Who shewed first at Rome the Water-horse and the Crocodiles. Diverse reasons in Physicke found out by dumbe creatures.
27. Of beasts and other such creatures which have taught us certaine hearbes, to wit, the red Deere, Lizards, Swallowes, Tortoises, the Weasell, the Stork, the Bore, the Snake, the Panther, the Elephant, Beares, Stocke-Doves, House-Doves, Cranes, and Ravens.
28. Prognostications of things to come, taken from beasts.
29. What cities and nations have been destroyed by small creatures.
30. Of the Hiana, the Crocuta and Mantichora: of Bievers and Otters.
31. Of Frogs, Sea or sea-Calves, and Stellions.
32. Of Deere both red and fallow.
33. Of the Tragelaphis: of the Chamæleon, and other beasts that chaunge colour.
34. Of the Tarand, the Lycaon, and the Wolfe called Thoës.



35. Of the Porc-espines.
36. Of Beares, and how they bring forth their whelpes.
37. The rats and mice of Pontus and the Alps: also of Hedgehogs.
38. Of the Leontophones, the Onces, Graies, Badgers, and Squirrels.
39. Of Vipers, Snailles in shels, and Lizards.
40. Of Dogs.
41. Against the biting of a mad dog.
42. The nature of Horses.
43. Of Asses.
44. Of Mules.
45. Of Kine, Bulls, and Oxen.
46. Of the Boeufe named Apis.
47. The nature of sheepe, their breeding and generation.
48. Sundrie kinds of wooll and cloths.
49. Of sheepe called Musmones.
50. Of Goats and their generation.
51. Of Swine and their nature.
52. Of Parkes and Warrens for beasts.
53. Of beasts halfe tame and wild.
54. Of Apes and Monkies.
55. Of Hares and Connies.
56. Of beasts halfe savage.
57. Of Rats and mice: of Dormice.
58. Of beasts that live not in some places.
59. Of beasts hurtfull to straungers.

In summe, there are in this Booke principall matters, stories, and observations worth the remembrance 788.

Latine authors alledged.

Mutianus, Procilius, Verrius Flaccus, L. Piso, Cornelius Valerianus, Cato Censorius, Fenestella, Trogus, Actius, [Columella](#), Virgil, Varro, Lu. Metellus Scipio, Cornelius Celsus, Nigidius, Trebius Niger, Pomponius Mela, Manlius Sura.

Forraine writers.

King Iuba, Polybius, Onesicritus, Isidorus, Antipater, Aristotle, Demetrius the naturall Philosopher, Democritus, [Theophrastus](#), Euanthes, Agrippa who wrote of the Olympionica, Hiero, king Attalus, king Philometer, Ctesias, Philistius, Amphilochus the Athenian, Anaxipolis the Thasian, Apollodorus of Lemnos, Aristophanes the Milesian, Antigonus the Cymæan, Agathocles of Chios, Apollonicus of Pergamus, Aristander of Athens, Bacchus the Milesian, Bion of Soli, Chæreas the Athenian, Diodorus of Pyreæum, Dio the Colophonian, Epigenes of Rhodes, Evagon of Thassus, Euphranius the Athenian, Hegesias of Maronea, Menander of Pyreæum, Menander also of Heracles, Menecrates the Poet, Androcion who wrote of Agriculture or Husbandrie, Aeschrion who likewise wrote of that argument, Dionysius who translated Mago, Diophanes who collected an Epitome or Breviarie out of Dionysius, king Archelaus, and Nicander.



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October 13, Saturday: The apparently robust [Tycho Brahe](#) became suddenly very ill at a dinner party hosted by Peter Vok von Rosenberg in Prague, which was then in Bohemia but is now part of the Czech Republic. Friends and relatives suspected poison.



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October 24, Wednesday: Seeming to be recovering, the 54-year-old [Tycho Brahe](#) took the precaution of bequeathing his coveted observational records and his astronomical instruments to his heirs. Then, suddenly and unexpectedly, he fell seriously ill again, and overnight he died. Quite likely, he had been poisoned a second time with the same mercury potion, by [Johannes Kepler](#), who had motive, means, and opportunity — although nobody at that time seems to have recognized this likelihood:

Thereafter between prayers and exhortations, he said goodbye to us all and to this life so tranquilly that he was not seen or heard to fail.

The attending physician opinioned that he died when his bladder burst, but we know that this sort of behavior is utterly inconsistent with such an hypothesis.

Famous Last Words:



"What school is more profitably instructive than the death-bed of the righteous, impressing the understanding with a convincing evidence, that they have not followed cunningly devised fables, but solid substantial truth."

— A COLLECTION OF MEMORIALS CONCERNING DIVERS DECEASED MINISTERS, Philadelphia, 1787




"The death bed scenes & observations even of the best & wisest afford but a sorry picture of our humanity. Some men endeavor to live a constrained life — to subject their whole lives to their will as he who said he might give a sign if he were conscious after his head was cut off — but he gave no sign Dwell as near as possible to the channel in which your life flows."

—Thoreau's JOURNAL, March 12, 1853

1601	Tycho Brahe	unsolicited comment	<i>"Let me not seem to have lived in vain."</i>
1618	Sir Walter Raleigh	his wife would embalm his head and keep it near her in a red leather bag	<i>"Strike, man, strike."</i>
1649	Charles I	the chopper was to wait for a signal that the king had prepared himself	<i>"Stay for the sign."</i>
1659	Friend Marmaduke Stevenson and Friend William Robinson	unsolicited comments made over the muting roll of a drum intended to prevent such remarks from being heard	<i>Friend Marmaduke: "We suffer not as evil-doers but for conscience' sake." Friend William: "I die for Christ."</i>
1660	Friend Mary Dyer	asked at her execution whether they should pray for her soul	<i>"Nay, first a child; then a young man; then a strong man, before an elder of Christ Jesus."</i>
<i>... other famous last words ...</i>			

November 4, Sunday: The remains of [Tycho Brahe](#), with his signature handlebar mustache, were interred in the Teyn-church in Prague. The tombstone expresses an expectation or wish that **NON FACES NEC OPES, SOLA ARTIS SCEPTRA PERENNANT**, "Neither power nor wealth, only art and science will endure" (fortunately, not only art and science, but also this mustache, would endure).

1602

 The most recent [supernova](#) inside the Milky Way galaxy (our own local galaxy), of which the light has at yet reached the earth, occurred.³³

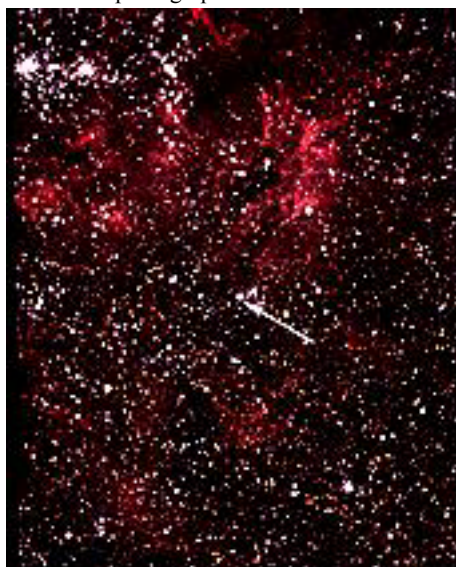
The most recent nearby supernova explosion, outside this galaxy, would occur in 1680. We now refer to its remnant as “Cassiopeia A.” Besides these two, another two recent [supernova](#) explosions had been observed by [Tycho Brahe](#) in 1572 and by his supposed murderer [Johannes Kepler](#) in 1604.

1603

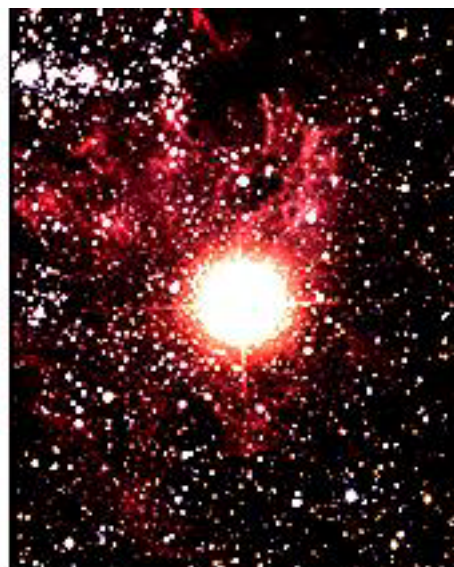
The Dominican monk Tomasso Campanella had predicted that the sun was going to collide with the Earth in this year. (Weber, Eugen. APOCALYPSES. Cambridge MA: Harvard UP, 1999, page 83)

HERE COME DA JUDGE!

33. Supernovas occur approximately every one to four human generations. It may take a very long time for the light from a distant explosion to reach the earth. The most recent observation of a supernova explosion from a more distant galaxy occurred in 1987, when there was a supernova explosion (1987A) noticeable in the Large Magellanic Cloud, a companion galaxy to the Milky Way. Here are before and after photographs:



BEFORE



AFTER

“Stack of the Artist of Kouroo” Project

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"I would not run round a corner
to see the world blow up."
— [Henry Thoreau](#),
"LIFE WITHOUT PRINCIPLE"



1604

[Galileo Galilei](#) produced a compelling theoretical description of the behavior of freely falling bodies. They all fall at the same rate regardless of their mass because they obey a law, the law of uniformly accelerated motion.

1605

[Johannes Kepler](#), who himself had never seen and would never see a total [eclipse](#) of the sun, suggested that the solar corona was light being reflected by matter around the [sun](#).



To justify his astronomical inferences, he needed to make reference to the laboratory records of [Tycho Brahe](#)'s observations. He therefore acknowledged that it had been him who had made away with these valuable records immediately upon Brahe's death:

I do not deny that, Tycho being dead and his heirs either absent or too little skilled, I usurped the care of the remaining observations for myself....

1607

September 25, morning (This was September 15th, on the Julian calendar then still in use.): George Popham's group, which would be erecting a Fort George near the mouth of the Kennebec River in what is now Maine after having arrived there during that late summer, on this morning witnessed a "blasing starre" in the northeastern skies — [Halley's Comet](#) was coming back.

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JAMESTOWN'S LOST TWIN

**By David Brown,
Washington Post Staff Writer,
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Thursday, November 23, 2000; Page A01

POPHAM BEACH, Maine — Occasionally when twins are born prematurely and under difficult circumstances, one dies, the other lives, and it's never clear why. Chance and circumstance seem to favor one. The other is lost, and its history remains forever brief and mysterious.

Post-Elizabethan England gave birth to such a set of twins—two American colonies—in 1607. One was named Jamestown. It survived; its descendants are alive today. The other was named Popham. It was abandoned, its remains were buried and forgotten.

You can read about Jamestown, the famous colony in Virginia, in any American history textbook. Some day, that may also be true of its lost twin, the Popham Colony, whose grave has been found and is being meticulously unearthed in Maine.

The remnant of the Popham Colony, on a bluff where the Kennebec River enters the Atlantic Ocean, is one of the most important archaeological sites ever found in the United States.

It is undisturbed, and consequently can tell its whole story to researchers capable of reading its stained soil and broken artifacts. Equally significant, it's a record of failure. Because the colony lasted only 13 months—August 1607 to September 1608—the site is uncontaminated by the material of long-term settlement. What remains is a time capsule from the dawn of English-speaking America.

Like Jamestown, the Popham Colony was founded by a royally chartered company whose primary goal was profit. Its members sailed from England a few months after the Jamestown expedition. Like Jamestown, Popham was led by English aristocrats with the assistance of soldiers, and consisted entirely of about 100 men and boys. Like their brethren at Jamestown, the Popham colonists built a fort and foundationless buildings constructed around posts driven into the ground. Astonishingly, they also built a 50-foot sailboat sturdy enough to carry them home.

Jamestown struggled through Indian attack, attempted mutiny and starvation before becoming, after a dozen years, a prosperous settlement of 5,000 people. Popham Colony suffered few of those initial depredations, but fell victim to an unexpected twist of fate. Its first leader died. The man who succeeded him inherited the family title and lands when his older brother died in England during the colony's first year. When the heir heard the news he returned home without delay, and the rest of the settlers went with him.

Something other than the Popham Colony's mere preservation makes the site so informative. It comes with a feature unique among the first English settlements: a map.

Drawn seven weeks after arrival by a man named John Hunt (who



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was probably a military cartographer), the map shows a modified star fort fitted to a headland. It has a "scale of feet & Paces." Each building is located, labeled and sketched in profile (or "elevation," in architectural terms).

The Hunt map is the only record of what buildings in early English colonies actually looked like. It provides an unprecedented visual picture of an era in American history whose only remnants are underground and in pieces. But is it accurate? In this season's dig, the excavators found the "footprint" of the house occupied by the colony's second-in-command. It's the second structure located, and was exactly where the Hunt map said it would be.

"I now believe it's a perfectly reliable guide to the archaeology of the site," said Jeffrey P. Brain, the researcher in charge of the project. "It is a document that every archaeologist would kill for."

The Hunt map shows 18 buildings. How many were actually erected—and how many were wishful thinking—is a question whose answer will be revealed with painful slowness as the Popham Colony site is excavated over the next five years.

"It's a no-brainer that this site is nationally significant. It's of just absolutely supreme importance," said Robert Bradley, an archaeologist with the Maine Historic Preservation Commission, which is funding the dig with a grant from the U.S. Department of the Interior.

Apart from what it may add to the history of colonial America, the Popham Colony site reveals a more general truth: Much of America's European past is only now being found, 400 years after the fact.

For instance, the original Jamestown settlement, long assumed to have eroded into the James River, was identified in 1994, the same year the Popham site was positively identified. In 1997, archaeologists from East Carolina University found evidence of English sojourners from 1585 on the site of an ancient Indian village on Hatteras Island. Last summer, a Jesuit mission from the 1634 settlement of Maryland was discovered in St. Mary's County.

"I think there's an awful lot more," said James F. Deetz, a professor at the University of Virginia and a leading colonial archaeologist. "We know from records of the existence of all sorts of fortified villages and forts from the 17th century. We even know where they are. And yet we only have archaeological data on four or five."

The Popham Colony's story begins with a charter from James I to the Virginia Company, allowing it to settle the east coast of North America. The company was divided into two ventures—the London Company, which had the rights to the southern coast (roughly Cape Fear to the Potomac River), and the Plymouth Company, which had the northern coast (Long Island to New Brunswick). Whichever company established a successful colony in its own zone could then move to claim the zone between.

The colony was named after its main financial backer, Sir John Popham, the Lord Chief Justice of England. His nephew, George Popham, was the leader and had the title "president." Second to him, named "admiral," was Raleigh Gilbert, a relative of the maritime adventurer Sir Walter Raleigh (who spelled his name



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differently from many of his kinsmen and descendants). About 100 colonists sailed from Plymouth, England, on May 31, 1607 aboard two ships, Gift of God and Mary and John. They took formal possession of the Kennebec River site on Aug. 19. There followed a flurry of construction of what the colonists called Fort St. George. They erected enough buildings to store supplies and house the 45 people who stayed for the winter. (The rest returned to England on the two ships in October and December.)

George Popham died of unknown causes the following February, and Raleigh Gilbert assumed command. A resupply ship in the spring found "all things in good forwardness." The colonists had finished building a sailing ship, which they named Virginia of Sagadahoc (Sagadahoc being the Indian name for the Kennebec). They had traded for furs with the natives, and gathered sarsaparilla root for sale back home as a medicinal.

In the fall, however, a ship brought news that Raleigh Gilbert's brother John, who had no children, had died. Raleigh was John's heir, and it didn't take the admiral long to calculate where his best prospects lay. He folded the colony's tent and everyone headed home.

The Popham Colony became a footnote in history, although it was never entirely forgotten.

The Hunt map was somehow acquired by the Spanish ambassador to England in 1608, and sent to Spain. It was found in the royal archives in Simancas in 1888. Soon after, two Maine historians used topographical information from the map to deduce the likely location of the colony. An archaeologist in the 1960s dug a series of test pits, finding a few 17th century artifacts, but no fortifications. He concluded that either the location was wrong or the fort had eroded away.

In the early 1990s, Brain, an archaeologist with the Peabody Essex Museum in Salem, Mass., learned of the site while vacationing nearby. He had spent most of his career at Harvard, and done most of his digging at Indian sites in the Mississippi Valley. Like most Americans, he knew nothing of the Popham Colony. But after a little research, he became convinced it deserved another, closer look.

In 1994, he and some assistants dug for several weeks, finally coming across a few artifacts from the 1600s and a single "post mold"—the pulverized, underground end of a wooden post. Brain thought it might be a remnant of the storehouse, the fort's largest structure, but further digging that season failed to find another post mold, so he wasn't certain.

Because of funding problems, excavation didn't resume until 1997. By then, Brain had made a crucial deduction. To best fit the site's topography, the Hunt map needed to be rotated 20 degrees to the east of magnetic north. Brain theorized the single post mold he'd found might be one of the nine on each side of the storehouse as depicted on Hunt's map.

When he returned to the field, he drew a line through the post mold in the proper orientation and began to dig. Soon, the excavators found five more, right where the map said they'd be. "It was probably the most exciting moment I've had in archaeology," Brain said of unearthing the first predicted one. "To be able to have a hypothesis and confirm it so precisely.



ASTRONOMY

ASTRONOMY

It was a eureka moment."

Since then, the team has found more than a thousand artifacts. Shards of North Devon ceramic from England and salt-glazed Bellarmine stoneware from Germany. Pieces of bottle glass. Fragments of plate armor. Buttons. The most unusual item is a caulking iron, which looks like a small hatchet head and is used for sealing the joints in ship hulls.

"People of the period were notoriously sloppy and dirty. They left a lot behind," said Brain.

He spends the digging season overseeing the two-acre site in a floppy hat, carrying an archaeologist's wooden meter-rule like a swagger stick. The actual diggers are about a dozen men and women, ranging in age from their early twenties to their sixties, who squat and work under a vinyl canopy.

Digging is labor-intensive, and there aren't enough trained archaeologists, or graduate students, to do it. So as with many sites, Fort St. George has a "field school" that permits amateurs to learn the methods of archaeological excavation on the job. Students pay \$600 for a week of hard labor, with lodging at a bed-and-breakfast. Among them this season were two middle-aged American men descended from the Pophams.

Another was Emma Lincoln, a 21-year-old Amherst College student whose home is Garrett Park, Maryland. She spent a week last summer in a one-meter square space that might-or might not-have been part of the footprint of Raleigh Gilbert's house. After she'd meticulously removed about five inches of dirt with a mason's trowel over the course of five days, the archaeologists still weren't sure. Still, she wasn't disappointed in her patch of ground.

"I found little things. They're exciting for me," said Lincoln, holding out a musket ball and a piece of melted lead, four centuries old.

The totality of the site -coupled with the excavations underway at Jamestown- is painting a revisionist picture of the first colonies. No longer does it seem that the first settlers were largely helpless "gentlemen" unwilling to work. Instead, they appear to have been skilled workers capable of stupendous productivity under harsh circumstances. When they failed, it was not from lack of inventiveness, but because of poor leadership, bad luck or the inherent instability of all-male commercial ventures.

"In many ways, it was very analogous to what's happening today with the Internet," said Stuart Bolton, a historian at Plimoth Plantation, in Massachusetts. "Everyone was absolutely convinced that it [North America] was going to be this huge source of wealth. But they just weren't certain in which direction they were going to find it."

Both the Popham and Jamestown colonies, for example, assigned people to look for mines or metal, thinking that was where fortune lay. It took a while to figure out that fish, tobacco and white pine for ship masts would be the first route to North American riches.

ASTRONOMY

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September 25, Tuesday night: After witnessing a Prague fireworks display, [Johannes Kepler](#) noticed that there was a natural fireworks display higher in the heavens: [Halley's Comet](#). During this visit the [comet](#) would be assigned responsibility for, among other things, a plague that would strike in Saxony and Thuringia, seven years of famine that would follow, plus the general aggressiveness of the Turks.



This apparition would turn [Thomas Hariot](#)'s attention toward [Astronomy](#).



October 5, Friday: Despite a full moon, [Johannes Kepler](#) saw that [Halley's Comet](#) had a ten-degree tail.

ASTRONOMY

October 27, Saturday: [Halley's Comet](#) whipped around the sun, after having plunged by Earth with its tail already peculiarly spectacular.

ASTRONOMY



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, → 1,057 BCE, → 466 BCE, → 391 BCE, → and 315 BCE, → but then on the 240 BCE → return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE → and again in 87 BCE, → and then it was recorded as being seen in 12 BCE, → 66 CE, → 141 CE, → 218 CE, → 295 CE, → 374 CE, → 451 CE, → 530 CE, → 607 CE, → 684 CE, → 760 CE (only by Chinese), → 837 CE, → 912 CE, → 989 CE, → 1066, → 1145, → 1222, → 1301, → 1378, → 1456, → 1531, → 1607, → 1682, → 1758, → 1835, → 1910, → and 1986 → – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY



ASTRONOMY

ASTRONOMY

1608

The 1st glass factory in America was built, and glass would be carried in the 1st cargo exported to England. What the colonies possessed by way of raw materials, of course, that the home country lacked, was not sand for silica but fuel for the furnaces.

GLASS WINDOWS

Hans Lippershey (1570-1619), a German-born lens maker in the Netherlands, applied for a patent for an optical refracting telescope, made from two lenses, a converging objective lens and a diverging eye lens, intending his invention for warfare. Galileo would soon be redirecting this war device toward the heavens.³⁴ It would become apparent that a major problem limiting the usefulness of this device: chromatic aberration caused the images to be fuzzy as light of different colors was brought to a focus at different focal lengths. It would not be until 1668, fully sixty years later, that Isaac Newton would be able to develop a device using one lens and a mirror, the optical reflecting telescope, and for the 1st time correct for this most salient design flaw.

HISTORY OF OPTICS

October 2, day: Hans Lippershey offered the Dutch government a new invention — the [telescope](#).

ASTRONOMY

34. It wouldn't take long for scientists to figure out that if you turned a telescope, intended for gazing at very distant and large objects, around, it became a device by which they could gaze at very close and small objects, a microscope.

1609

Early in the year, [Thomas Hariot](#) purchased a “Dutch trunke” ([telescope](#), invented in the previous year), and turned it toward the skies. This was one of the first uses of the new instrument for astronomy. He is now credited as having made himself the very 1st astronomer to draw an astronomical object as viewed through this new device.

As [Johannes Kepler](#) was publishing his COMMENTARIES ON THE MOTIONS OF [MARS](#), made up entirely out of

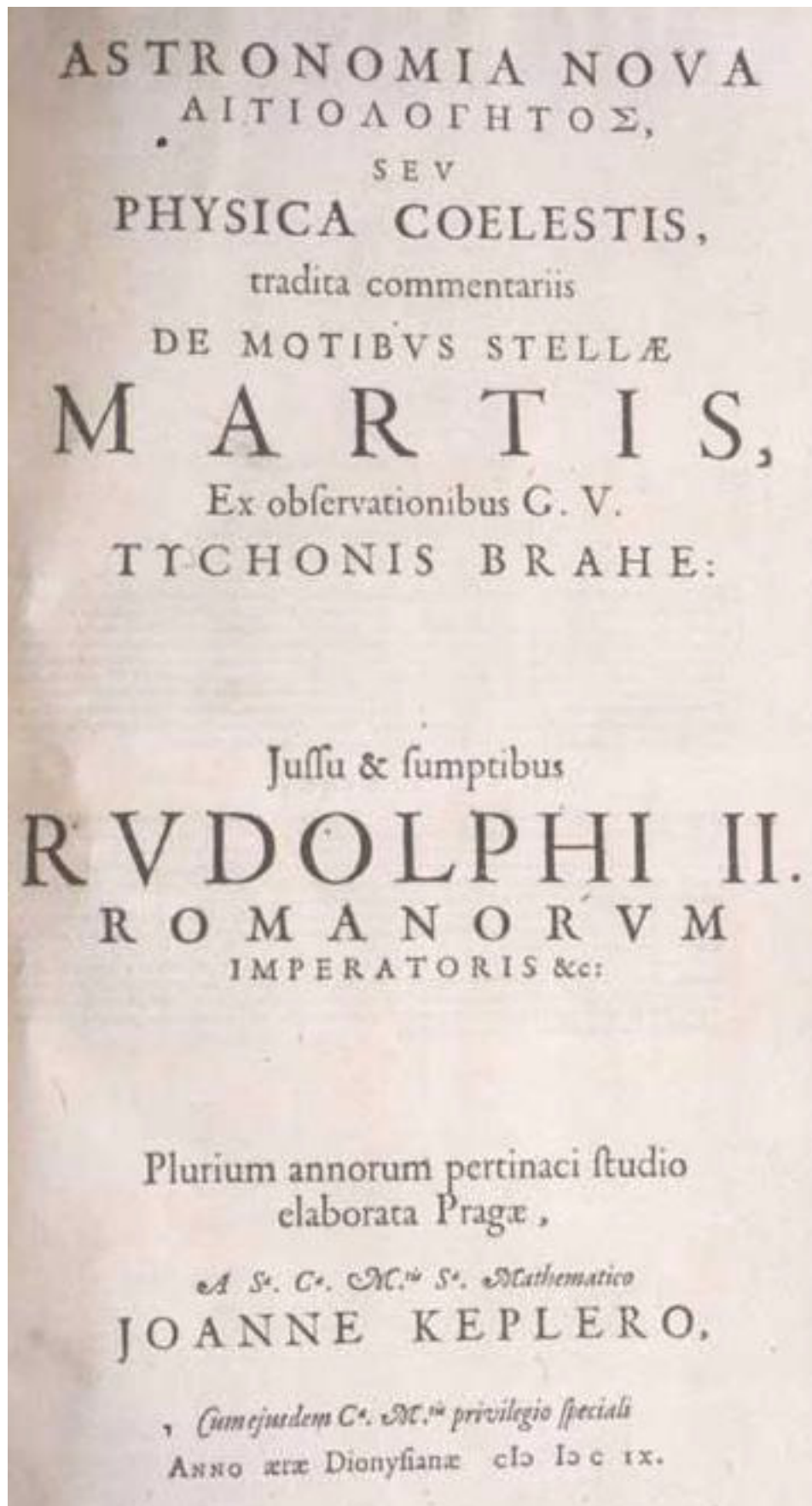


naked-eye observations of positions in the sky, the first telescopes were being turned skyward in efforts to determine more about these strange wanderers among the fixed stars than their relative positions and movements. [Galileo Galilei](#) of the Republic of Venice was hearing rumors out of Holland of a new device by which “visible objects, though very distant from the eye of the observer, were seen distinctly as if nearby.” He constructed his own version of Hans Lippershey’s [telescope](#) of 1608, with a converging objective lens and a diverging eye lens, and began to point it generally upward.

HISTORY OF OPTICS

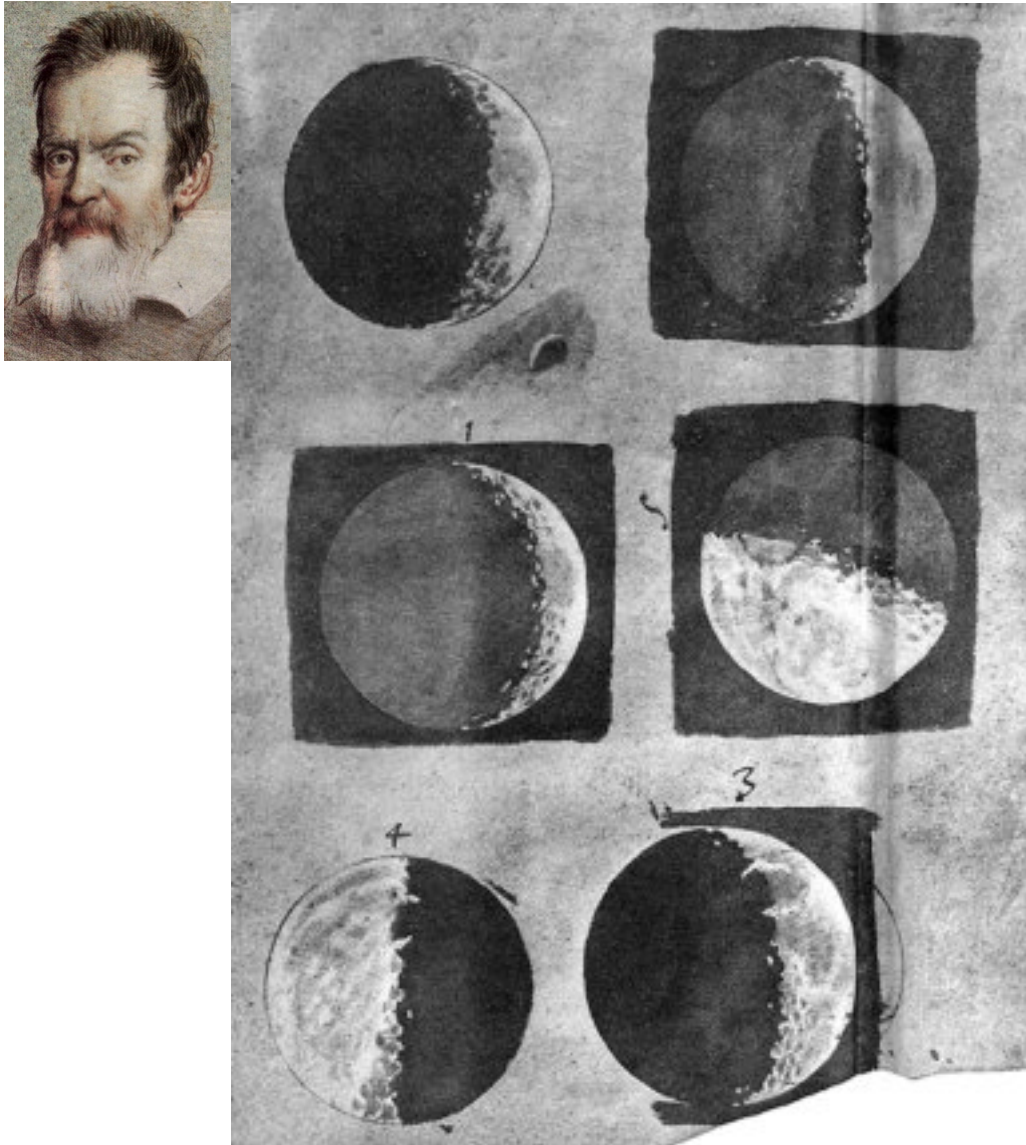
The Venetian senate examined Galileo’s device. It would prove useful for early [longitude](#) observations, by observing occultation and emergence of the [moons](#) of Jupiter.

CARTOGRAPHY



ASTRONOMY

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A WEEK: The anecdotes of modern astronomy affect me in the same way as do those faint revelations of the Real which are vouchsafed to men from time to time, or rather from eternity to eternity. When I remember the history of that faint light in our firmament, which we call Venus, which ancient men regarded, and which most modern men still regard, as a bright spark attached to a hollow sphere revolving about our earth, but which we have discovered to be **another world**, in itself, – how Copernicus, reasoning long and patiently about the matter, predicted confidently concerning it, before yet the telescope had been invented, that if ever men came to see it more clearly than they did then, they would discover that it had phases like our moon, and that within a century after his death the telescope was invented, and that prediction verified, by Galileo, – I am not without hope that we may, even here and now obtain some accurate information concerning that OTHER WORLD which the instinct of mankind has so long predicted. Indeed, all that we call science, as well as all that we call poetry, is a particle of such information, accurate as far as it goes, though it be but to the confines of the truth. If we can reason so accurately, and with such wonderful confirmation of our reasoning, respecting so-called material objects and events infinitely removed beyond the range of our natural vision, so that the mind hesitates to trust its calculations even when they are confirmed by observation, why may not our speculations penetrate as far into the immaterial starry system, of which the former is but the outward and visible type? Surely, we are provided with senses as well fitted to penetrate the spaces of the real, the substantial, the eternal, as these outward are to penetrate the material universe. Veias, Menu, Zoroaster, Socrates, Christ, Shakespeare, Swedenborg, – these are some of our astronomers.

ASTRONOMY

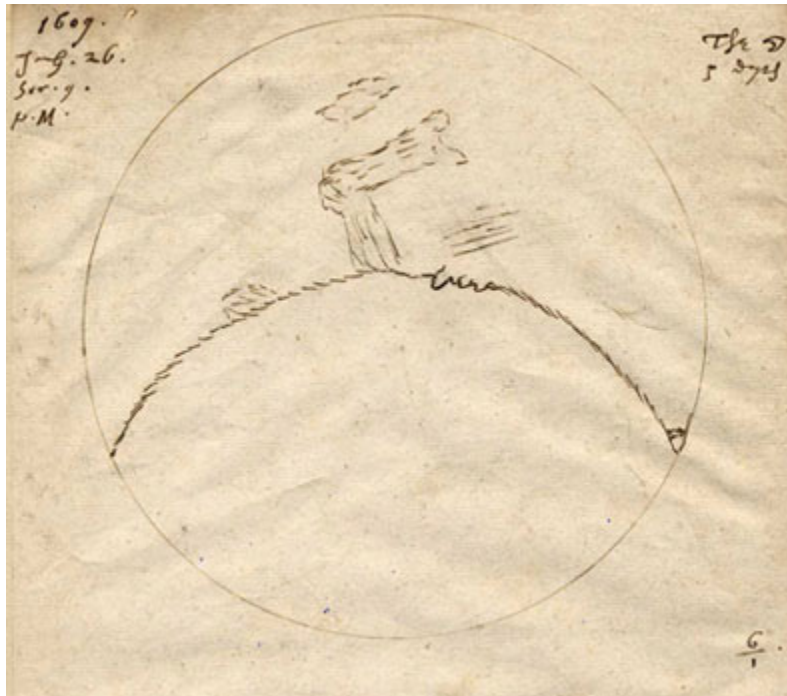
NICOLAS COPERNICUS

January 21: Joseph Scaliger, the chronologist and inventor of the Julian date, died.

ASTRONOMY

ASTRONOMY

June 26: Preceding [Galileo Galilei](#) by several months, [Thomas Hariot](#) drew a picture of the moon as seen through his [telescope](#).



November: [Galileo Galilei](#) turned his latest device, capable of 20X magnification, skyward. Was it this new device



which enabled him, in this year, to observe changing spots on the face of the [sun](#) and thus disprove the contention of the Aristotelians of his day that that heavenly body is unchangingly free of “imperfection”? (Independently, from Holland, Johann Fabricus was making this same observation in this same year.)



ASTRONOMY

ASTRONOMY

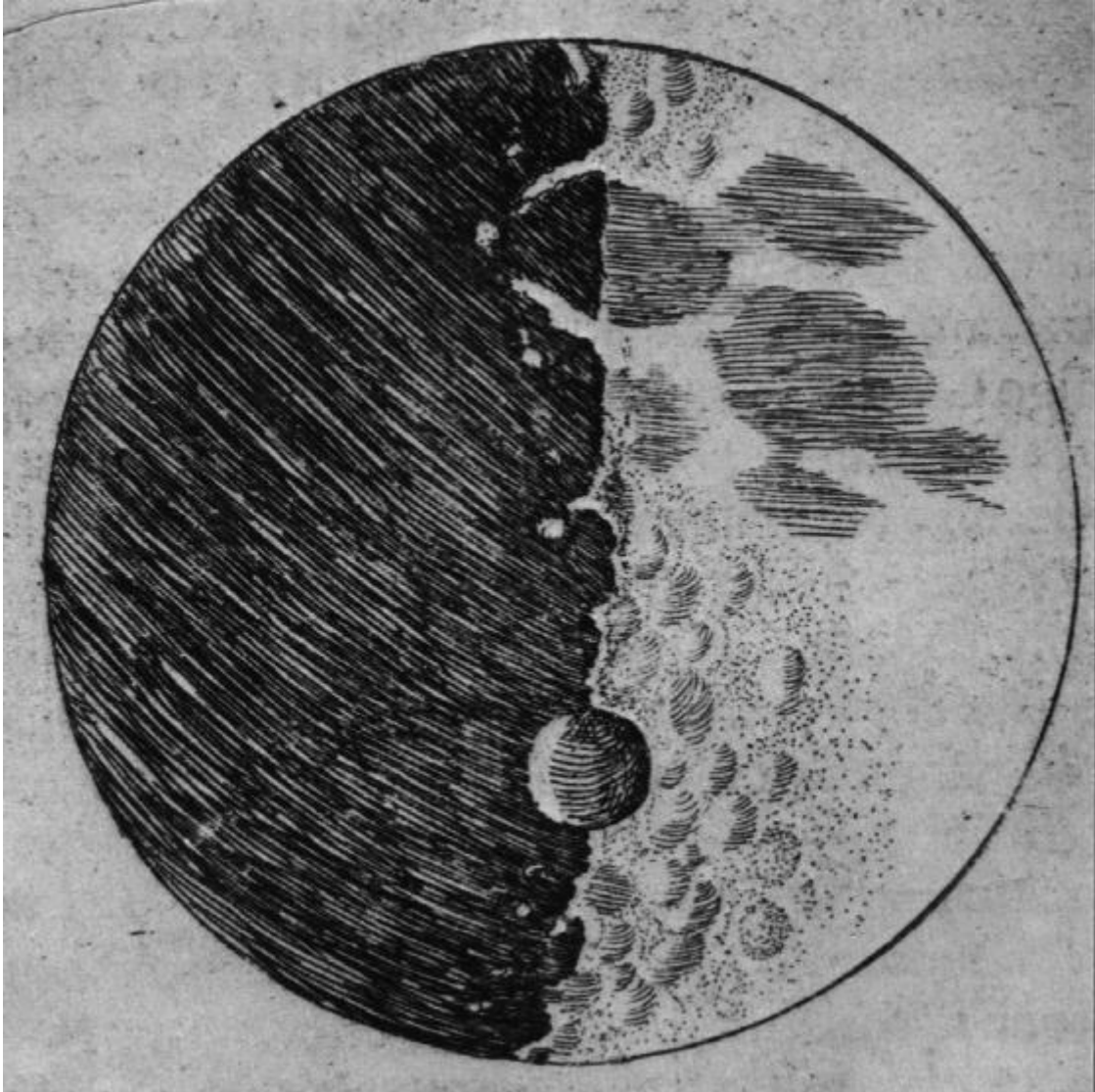
A WEEK: The anecdotes of modern astronomy affect me in the same way as do those faint revelations of the Real which are vouchsafed to men from time to time, or rather from eternity to eternity. When I remember the history of that faint light in our firmament, which we call Venus, which ancient men regarded, and which most modern men still regard, as a bright spark attached to a hollow sphere revolving about our earth, but which we have discovered to be **another world**, in itself, – how Copernicus, reasoning long and patiently about the matter, predicted confidently concerning it, before yet the telescope had been invented, that if ever men came to see it more clearly than they did then, they would discover that it had phases like our moon, and that within a century after his death the telescope was invented, and that prediction verified, by Galileo, – I am not without hope that we may, even here and now obtain some accurate information concerning that OTHER WORLD which the instinct of mankind has so long predicted. Indeed, all that we call science, as well as all that we call poetry, is a particle of such information, accurate as far as it goes, though it be but to the confines of the truth. If we can reason so accurately, and with such wonderful confirmation of our reasoning, respecting so-called material objects and events infinitely removed beyond the range of our natural vision, so that the mind hesitates to trust its calculations even when they are confirmed by observation, why may not our speculations penetrate as far into the immaterial starry system, of which the former is but the outward and visible type? Surely, we are provided with senses as well fitted to penetrate the spaces of the real, the substantial, the eternal, as these outward are to penetrate the material universe. Veias, Menu, Zoroaster, Socrates, Christ, Shakespeare, Swedenborg, – these are some of our astronomers.

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December 3: [Galileo Galilei](#) turned his latest device, capable of 20X magnification, upon our planet's [moon](#), and it being a clear night, this is what he was able to make out:



1610

[Galileo Galilei](#) reported several astronomical discoveries, including the fact that Jupiter has four moons.

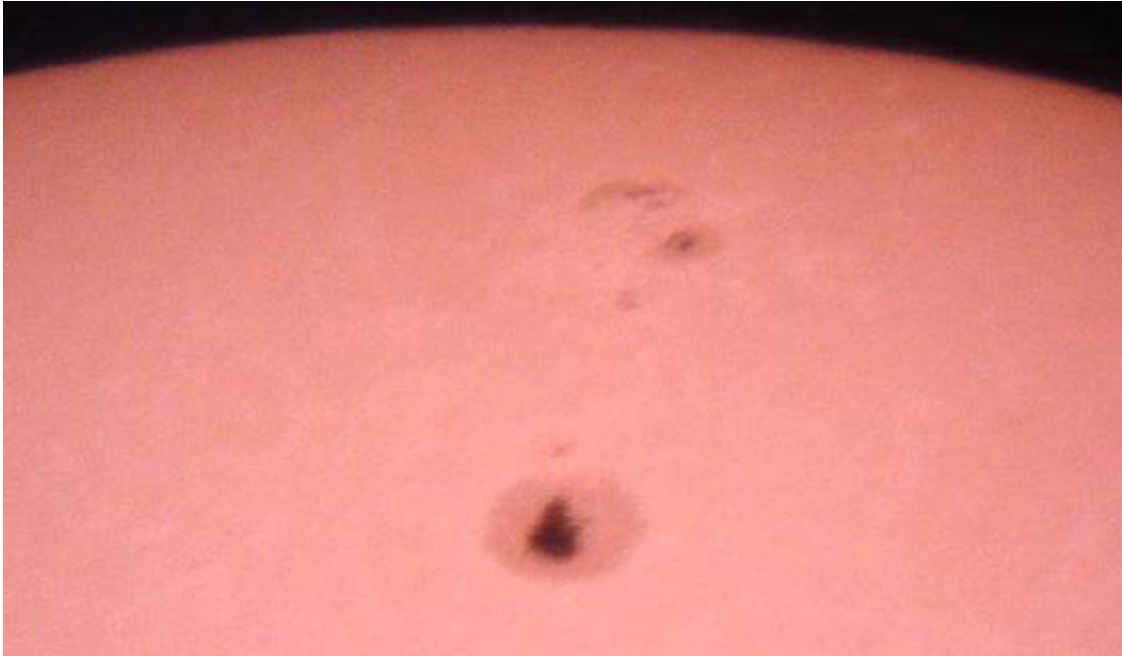
Here is [Thomas Hariot](#)'s map of the full moon:



Late in the year, [sunspots](#) were observed telescopically by two Frisian astronomers, Johannes and David Fabricius (in December, through his telescope, [Thomas Hariot](#) also observed these sunspots). Although sunspots had been seen by humans long before (by Chinese astronomers in 28 BCE), this Western observation would be the one that would produce large consequences in the debate over the nature of the solar system — by means of the observation of such imperfections it would be noted that the [sun](#) is a rotating object, and the comings and goings of such imperfections would indicate very clearly that, contrary to the received interpretation of Aristotle, the sun does change. No-one would be able to think of a way to cope with the details of their apparent motion within the cosmological scheme of Ptolemy, which would be one of the reasons for

adoption of the heliocentric system of Copernicus.

ASTRONOMY



1611

[Galileo Galilei](#) took with him on his trip to [Rome](#) in this year a little box containing fragments of a rock which had recently been discovered by the alchemists of Bologna, which he had been exposing to the sunlight at his home in Firenze. We now know this mineral as barium sulfide, but what it was termed in those days was “the solar sponge.” When this natural philosopher (scientist) took his colleagues into a dark room and opened the box, they could perceive a cold light emanating from the rock, a light which had been stored there for the length of time which it had taken to journey from Firenze to Roma. Florentine light in Rome! Galileo used this to demonstrate to them the wrongness of the Aristotelian understanding that light was a $\sigma\psi\mu\beta\epsilon\kappa\omicron\varsigma$ accident or quality of a transparent medium. No — light was a thing, it could be carried from place to place in a box.



I'll bet you didn't know that Galileo did stuff like that.

[Johannes Kepler](#), in his *DIOPTRICE*, presented an explanation of the principles involved in the convergent-lens/divergent-lens microscopes and telescopes. In the same treatise, he suggested that a telescope could be constructed using a converging objective in conjunction with a converging eye lens, that would later become known as “the astronomical telescope,” inverting the image, and described a combination of lenses that would later become known as “the telephoto lens.” He described total internal reflection but was unable to discover a satisfactory relationship between the angle of incidence and the angle of refraction.

HISTORY OF OPTICS

June: A description of [sunspots](#) was published by the Frisian astronomers Johannes and David Fabricius.

ASTRONOMY



1612

[Galileo Galilei](#) went to Rome, where he joined the Accademia dei Lincei. After for some months pointing out [sunspots](#) to astronomers in [Rome](#), he provided a correct explanation for the observation.

SKY EVENT



1614

1st table of logarithms, by John Napier.

1617

News items relating to the development of ELECTRIC WALDEN technology:

- John Napier used bones to demonstrate division by subtraction and multiplication by addition.
- At about this point Christopher Scheiner was building a telescope with converging objective and eye lenses, that is, one which inverted the image, as suggested by [Johannes Kepler](#) in his *DIOPTRICE* in 1611. (Although this type is now termed “the astronomical telescope,” actually we don’t know

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when the 1st such instrument originated.)

HISTORY OF OPTICS

**1618**

August 17, Friday: The first bright [comet](#) of this year, the first of three that would be seen, at this point whipped around the sun.

SKY EVENT

August 20, Monday: The first bright [comet](#) of this year, the first of three that would be seen, at this point came its closest to the earth.

A

Chronological TABLE

*Of the most remarkable passages in that part of
America, known to us by the name of NEW-
ENGLAND.*

Anno Dom.

1618. The blazing Star; then *Plymouth* Plantation
began in *New-England*.¹

¹ Set right by the author in *Voyages*, p. 248.

SKY EVENT

August 25, Saturday: The first bright [comet](#) of this year was first observed, from Hungary.

SKY EVENT

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August 27, Monday: The first bright [comet](#) of this year was observed by [Johannes Kepler](#) from near Linz, Austria.

[SKY EVENT](#)



August 28, Tuesday: The first bright [comet](#) of this year at this point was observed from Korea, and was described as being below Ursa Major in the morning sky and as having a bluish-white tail of more than 15 degrees in length.

[SKY EVENT](#)

ASTRONOMY

ASTRONOMY

September 6, Sunday: [Galileo Galilei](#) had been using a [telescope](#) of sorts for astronomical observations since around 1609. Nevertheless, when [Johannes Kepler](#) turned his telescope on this first bright [comet](#) of the year, he became the first of us to view this particular sort of celestial object under magnification.

SKY EVENT





ASTRONOMY

ASTRONOMY

September 25, Tuesday: The first bright [comet](#) of this year was observed for the last time, by [Johannes Kepler](#).

SKY EVENT

A few years later, Guillaume du Bartas would be writing, in his *DIVINE WEEKES AND WORKS*, that “A Blazing Star / Threatens the World with Famine, Plague, and War; / To princes death; to Kingdoms, many crosses, / To all Estates, inevitable Losses; / To Herdsmen, Rot; to Ploughmen, hapless Seasons; / To Sailors, Storms; to cities, Civil Treasons” (of course, actually he wrote this in French).

“Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people’s doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness.”

— [Nathaniel Hawthorne](#), THE SCARLET LETTER

November 8: The 2d bright [comet](#) of this year, the 2d of three that would be seen, at this point whipped around the sun at about the distance of the planet Mercury.

SKY EVENT

November 16: [John Fletcher](#)’s tragicomedy THE LOYAL SUBJECT was licensed to be performed.

The 2d bright [comet](#) of this year, the 2d of 3 that would be seen, was viewed from Earth before dawn on this date, in the form of a tail sticking up from the horizon into the constellation of Libra. Over the next few weeks more and more of this would come above these observers’ horizon, until the head of the comet would be visible in Libra and its tail would stretch all the way up to the bowl of the Big Dipper.

SKY EVENT

ASTRONOMY

ASTRONOMY

Early December: The 2d bright [comet](#) of this year, the 2d of three that would be seen, at this point was visible during the hours of daylight. It was of a reddish hue.

SKY EVENT

December 10: The tail of the 2d bright [comet](#) of this year, the 2d of three that would be seen, at this point stretched 104 degrees across the sky. This tail seems to have been approximately half as wide as the entire solar system. Both King James I of England and John Evelyn would come to believe that this comet had presaged the Thirty Years' War!



Up there!

In the heavens!

JAMES I

SKY EVENT

Last half of December: The tail of the 2d bright [comet](#) of this year, the 2d of three that would be seen, at this point stretched to the western side of the constellation of Ursa Major, while the head of the comet was close to the star Arcturus.

SKY EVENT

1619

The term “[Aurora Borealis](#)” was coined by [Galileo Galilei](#) to suggest the resemblance of the Northern Lights to an early dawn in the northern sky.

ASTRONOMY

Galileo was supposing incorrectly that the phenomenon was caused by sunlight reflecting from the high atmosphere. I will illustrate the mystery he was musing about with a painting made in 1865 by Frederic Edwin Church:



According to the article “Aurora and Airglow” in VAN NOSTRAND’S SCIENTIFIC ENCYCLOPEDIA:

The auroral zones are defined as the regions of maximum occurrence. They are roughly circular [and centered on the geomagnetic poles] with a radius of approximately 23 degrees of latitude. The northern auroral zone reaches its lowest geographic latitude over eastern Canada; the southern, over the ocean south of Australia. At times of geomagnetic disturbance, the aurora appears at lower latitudes and in very great magnetic storms may be observed in the tropics. The frequency of occurrence of aurorae at lower latitudes correlates with the cycle of solar activity.

January 22: The great 2d [comet](#) of 1618 was last seen on this night, at a point north of the Big Dipper.

SKY EVENT



ASTRONOMY

ASTRONOMY

1620

Blown plate was produced in London by grinding and polishing broad sheet, and was used for mirrors and coach plates.

GLASS WINDOWS

ASTRONOMY

ASTRONOMY

An English mathematician, Edmund Gunter,³⁵ developed a 66-foot chain made up of 100 links which would remain the standard surveying instrument until the beginning of the 20th Century, when it would be replaced by a steel tape. (Even today you will see property descriptions given in these 66-foot units.) Each link was fashioned of a piece of wire with loops at the ends and was 7.92 inches in length. The chain had brass handles at the ends. A rod was 25 links, also referred to as a “perch.” A statute mile was 80 of Gunter’s chains; an acre was 10 square chains.³⁶



Also in 1620, logarithmic tables were first published which made it possible to use portable instruments called theodolites for the accurate measurement of angles (the instruments in use for angle measurement in astronomy had always been simply too delicate and too cumbersome for use in the field). These topographical instruments had pivoted arms for sighting and could measure vertical angles as well as horizontal angles. Some of them would begin to be constructed with built-in magnetic compasses.

Meanwhile, in a news item relating to the development of ELECTRIC WALDEN technology:

- William Oughtred, another English mathematician, was developing the 1st slide rule.

35. This is the Gunter who invented the sector, and who introduced the terms *cosine* and *cotangent*.

36. Something you have to bear in mind about the practice of surveying is that it is not “high-tech,” but is of necessity a “good-character” occupation. The most desirable trait in a surveyor has always been honesty, and accuracy –although a close second– is definitely secondary to this indifference to the money outcome of a measurement. The purpose of a survey is not to enable a man to make use of a fraction of an inch strip of property that truly belongs to him, but to deter neighbors from murdering one another, and since it is good fences that make good neighbors, for purposes of keeping people away from each other the primary skills the surveyor must employ are frequently those involved in mediation rather than any mere sharpness of eye or brain. An inaccurate survey that two parties accept is inherently far superior to an accurate survey that only one party accepts. Thus the most basic equipment is often quite as good as the most elaborate. In the 19th Century a local surveyor needed a good reputation, perhaps a plane table for ease in calculation of angles, and a decimal chain. From time to time an instrument known as a “circumferentor” would also come in handy: such a circumferentor performed the function of a simple theodolite, and consisted of nothing more than a magnetic compass with arms holding slits for accuracy in sighting along the needle. A surveyor who really felt the need to be fancy could invest in the most rudimentary of theodolites, in order to posture before his customers peering intently into the eyepiece and taking mysterious notes.



1621

Willebrord Snell of Leiden discovered the relationship between the angle of incidence and angle of refraction at the point at which light passes from one transparent medium to another.

HISTORY OF OPTICS

December 3: [Galileo Galilei](#) experimented with his new [telescope](#).

1622

A news item relating to the development of ELECTRIC WALDEN technology:

- Base-ten logarithmic sliderule calculators appeared in Europe, greatly simplifying the multiplication and division of large numbers.³⁷

It was in this year that the Roman Catholic Church adopted January 1st as its official New Years Day. While the old date, March 25th, had the symbolic advantage of purporting to be the date of the Virgin Mary's impregnation by the Holy Spirit, this new date was more practical in that it was the date that currently started the Italian fiscal year. (So what's more important, money or symbolism?)

1623

A news item relating to the development of ELECTRIC WALDEN technology:

- Wilhelm Schickard (1592-1635) of Tübingen, Württemberg, a friend of the astronomer [Johannes Kepler](#), fashioned a working model of what he referred to as a "Calculating Clock." This was the 1st 4-function calculator-clock, a 6-digit machine that could add and subtract, and perhaps included an overflow indicator bell. Mounted on Schickard's clock was a set of Napier's Rods, a memory aid facilitating multiplications. The model and its plans would be lost and forgotten because there was a war going on. These drawings would be rediscovered in 1935, lost again, and retrieved again in

37. Although the ancient Babylonians had a calculator that could do tables of reciprocals, squares, cubes, square roots, and cube roots, Morris Kline, an American historian of mathematics, has derided the mathematical knowledge of the ancient [Egyptians](#) and Babylonians as "the scrawling of children just learning how to write."

ASTRONOMY

ASTRONOMY

1956, and the “Calculating Clock” would be reconstructed in 1960 from these drawings and found to have been quite functional:



1624

February 1: The same astrologers who had predicted that the Deluge would come on February 1, 1524 had, after the frustration of their first anticipation, recalculated the date as February 1, 1624. Oops, decimal point must have been in the wrong place. Come, the Deluge! (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 236-237)

MILLENNIALISM



1631

Development of the vernier, a surveying instrument permitting the more accurate reading of angles.

Winter: Captain Thomas James and his expedition were in winter camp on Charlton Island in James Bay in Canada. There they observed a lunar [eclipse](#) which was simultaneously being observed by Professor Henry Gellibrand at Gresham College in London. From comparison of these two careful observations, Professor Gellibrand would be able to calculate the **longitude** of Charlton Island as $79^{\circ} 30'$ — a longitude which is essentially correct. (This was the 1st successful astronomic observation for longitude in Canada.)

Arctic Explorations

Date	Explorer	Nation	Discovery
1501	Gaspar Corte Real	Portuguese	Newfoundland
1536	Jacques Cartier	French	St. Lawrence River, Gaspé Peninsula
1553	Richard Chancellor	English	White Sea
1556	Stephen Burrough	English	Kara Sea
1576	Martin Frobisher	English	Frobisher Bay
1582	Humphrey Gilbert	English	Newfoundland
1587	John Davis	English	Davis Strait
1597	Willem Barents	Dutch	Spitsbergen, Novaya Zemlya
1611	Henry Hudson	English	Hudson Bay
1616	William Baffin	English	Ellesmere and Devon Islands
1632	Thomas James	English	James Bay
1741	Vitus Bering	Russian	Alaska
1772	Samuel Hearne	English	Coppermine River to the Arctic Ocean
1779	James Cook	British	Vancouver Island, Nootka Sound
1793	Alexander Mackenzie	English	Bella Coola River to the Pacific
1825	Edward Parry	British	Cornwallis, Bathurst, Melville Islands
1833	John Ross	British	North Magnetic Pole
1845	John Franklin	British	King William Island
1854	Robert McClure	British	Banks Island, Viscount Melville Sound



ASTRONOMY

ASTRONOMY

1632

Inquisitorial denunciation of [Galileo Galilei](#). Part of his plea bargain would be agreeing to recite penitential psalms weekly.

1636

Francesco Fontana produced the first drawing of the surface features of the planet [Mars](#). His disk was perfectly circular and had a black dot at its center.³⁸

ASTRONOMY

38. This black dot was obviously due to an optical defect in his [telescope](#), as, turning it upon [Venus](#), he would be able to observe there the same black dot.

ASTRONOMY

ASTRONOMY

1637

In solving cubics in *LA GÉOMÉTRIE*, René Descartes applied the approach that had been used by the astronomer and poet [Omar Khayyam](#) during the 12th Century. (Although this was not worth a lot of money, it was worthy of recognition, as below.)



Also, by the way, Descartes's *DISCOURS DE LA METHODE*.

ASTRONOMY

ASTRONOMY

Pierre de Fermat would live for 18 more years after writing “I have found a truly wonderful proof which this margin is too small to contain,” — but would never find a margin big enough to contain any proof other than for exponents of 4.

$$z = \sqrt[4]{(x^4 + y^4)} \text{ is false.}$$

(Andrew Wiles’s new proof is 200 pages long.)



Q. “How do you make a turkey wait?”
 A. “I’ll tell you tomorrow.”

1639

November 24, Thursday: The transit of [Venus](#) across the sun was 1st observed, by William Crabtree and the Reverend Jeremiah Horrocks.

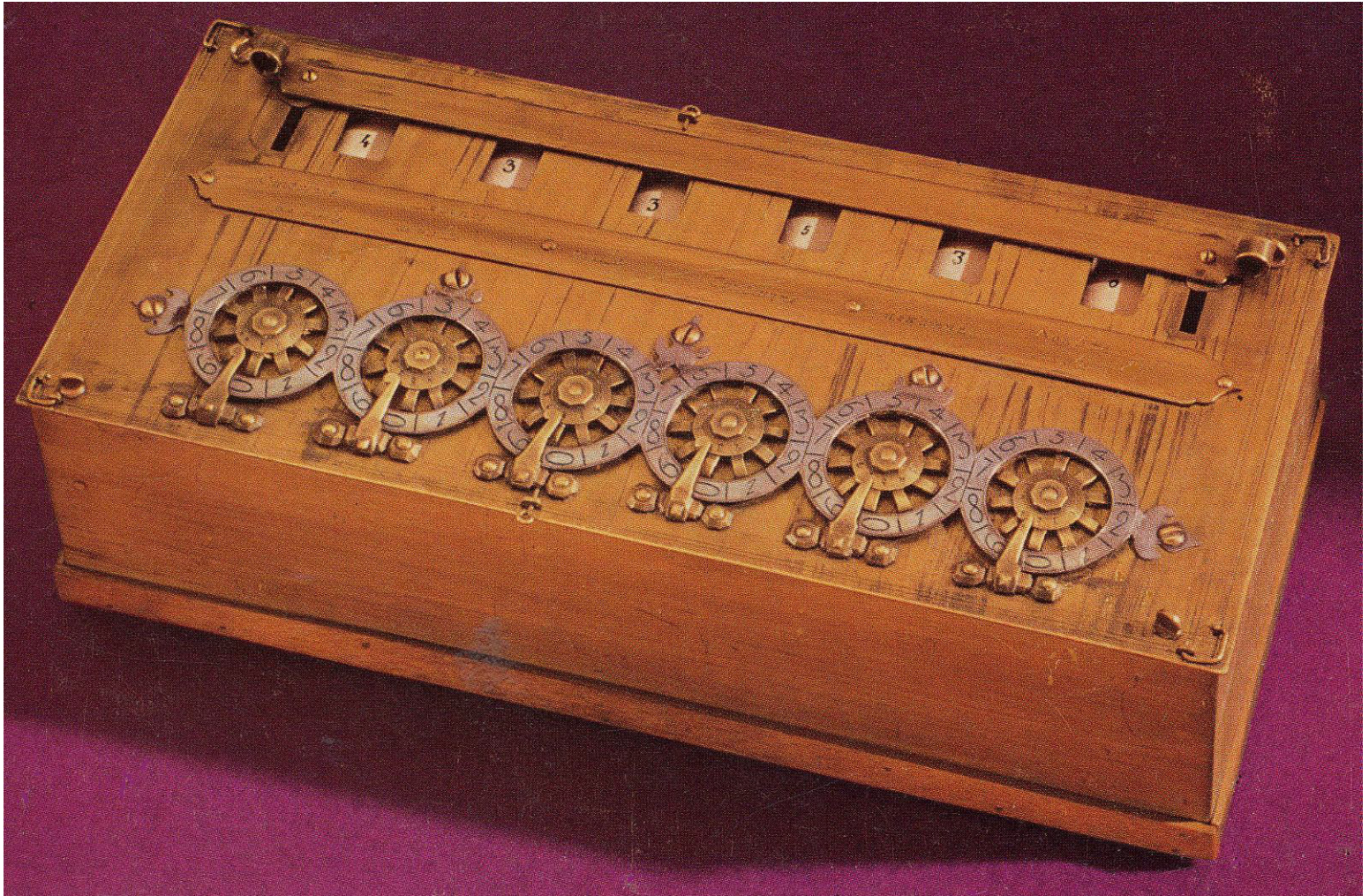
SKY EVENT



1642

A news item relating to the development of ELECTRIC WALDEN technology:

- In Paris, Blaise Pascal, now known more for his metaphysical and psychological insights, was devising the first mechanism for adding and subtracting, that is to say, the first digital calculator.³⁹



Cavaliers had a well-deserved reputation for being somewhat randy. For instance, in this year a pamphlet appeared, bearing the following as its title:

**A Blazing Starre seen in the West at Totneis.
Wherein is manifested how Ralph Ashley,
a deboyst⁴⁰ Cavalier,
attempted to ravish a young Virgin;
also how at that instant a fearfull Comet appeared;
likewise how he,**

39. I am not certain of the date on which Pascal came up with the idea, but he was also the first person to suggest the feasibility of a country-wide system of transport. This idea would receive its first implementation in 1784, in the introduction in England of a mail-coach system under the sponsorship of the Member of Parliament from Bath, John Palmer. The mail coaches were there put on a regular schedule and ran at ten miles per hour, regularly killing horses. Even improvements in the standardization of timekeeping would be necessary in consequence.

40. debauched

**persisting in his damnable attempt,
was struck down with a flaming sword
so that he died.**

COMETS

ASTRONOMY

"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER



1644

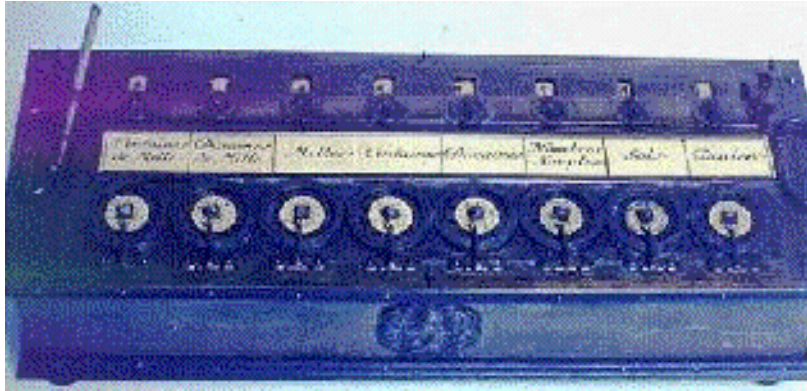
A news item relating to the development of ELECTRIC WALDEN technology:

- Blaise Pascal (1623-1662), of Paris, made his "Pascaline." This 5-digit machine could only add, and that probably not as reliably as Schickard's, but at least it didn't get forgotten — it established the computing machine concept in the intellectual community. (Pascal sold about 10-15 of the

ASTRONOMY

ASTRONOMY

machines, some supporting as many as 8 digits, and a number of pirated copies also were sold. No patents...) This is the same Pascal who invented the bus.



January 18: 1st UFO sighting in America, by perplexed Pilgrims in Boston. Along the waterfront in the evening, a number of Bostonians saw lights about the size of the full moon. They reported that two of these lights seemed to have been playing tag with each other in the skies above Noddle's Island.



January 25: In the English Civil War, the Battle of Nantwich.

The Committee of both Kingdoms was set up.

Two of the lights seen on the evening of January 18th reappeared over Boston harbor, and were accompanied by loud disembodied shouts which did not make any sense except that they seemed like commands.

December 24: Father Bartoli of [Naples](#) viewed what appeared to him to be two patches on the lower part of the disk of [Mars](#).

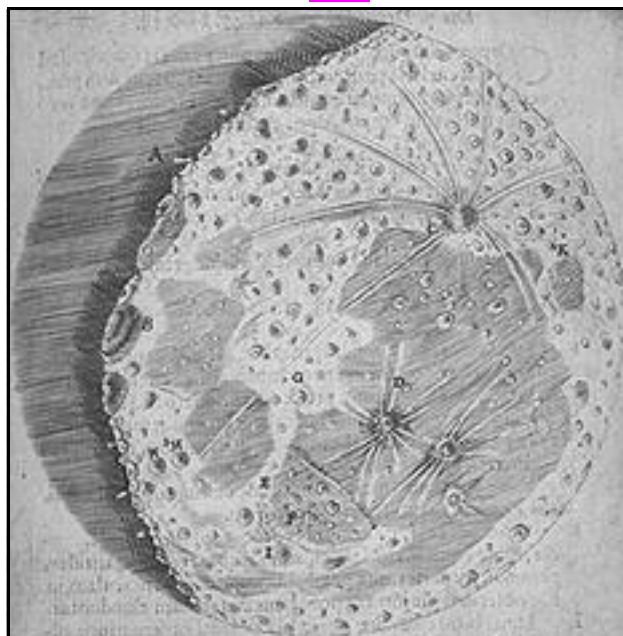
ASTRONOMY

1645

Blaise Pascal's *LETTRE SUR LE SUJET DE LA MACHINE INVENTÉE PAR LE SIEUR B.P. POUR FAIRE TOUTES SORTES D'OPÉRATION D'ARITHMÉTIQUE*.



December 6: Francesco Fontanas took a close look at the [moon](#):





ASTRONOMY

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1646

July 1: G.W. von Leibnitz, who would invent a mechanical calculator which could multiply and divide, was born in Leipzig.

August 19: John Flamsteed, 1st astronomer royal of England, was born.

1647

B. Cavalieri derived a relationship between the radii of curvature of the surfaces of a thin lens and its focal length.

From this year into 1654 Blaise Pascal would be performing experiments and generalizing his law of pressure

HISTORY OF OPTICS

(Pascal's Law).



1650

The [astrolabe](#), the most frequently utilized navigational instrument, would begin at this point to be replaced by more specialized and accurate instruments.



1652

A [comet](#) appeared just before the Reverend John Cotton's sickness and disappeared after his death on December 23rd. Samuel Danforth would argue in 1664 in general that comets were "portentous signals of great and notable changes" and that they have often been "heralds of wrath to a secure and impenitent world," and would point up this correlation between the demise of the good Reverend and the sky event. Nathaniel Morton's NEW ENGLAND'S MEMORIAL, printed in 1669, would also allude to this comet in regard to the death of John Putnam, saying that it had been "a very signal testimony that God had then removed a bright star and a shining light out of the heaven of his Church here into celestial glory above." In regard to another comet, Morton would insist that "it was no fiery meteor caused by exhalation, but it was sent immediately by God to awaken the secure world," and go on to show how in the year in which it appeared it had "pleased God to smite the fruits of the earth—namely, the wheat in special— with blasting and mildew, whereby much of it was spoiled and became profitable for nothing, and much of it worth little, being light and empty. This was looked upon by the judicious and conscientious of the land as a speaking providence against the unthankfulness of many,... as also against voluptuousness and abuse of the good creatures of God by licentiousness in drinking and fashions in apparel, for the obtaining whereof a great part of the principal grain was oftentimes unnecessarily expended."



ASTRONOMY

ASTRONOMY



"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER



Athanasius Kircher's *OEDIPUS AEGYPTIACUS* was published in [Rome](#).



He was the Joseph Campbell of the era and, Joseph-Campbell style, he easily equated [Isis](#) with Cybele the Mother of the Gods, with Minerva, with Venus, with Juno, with Proserpina, with Ceres, with Diana, with Rhea (Mother Earth), with the war-goddess Bellona, with Hecate, with the Moon, and with the “polymorphous Daemon.”

ASTRONOMY

ASTRONOMY

Here she is:



Sameness was all over the place. You only had to put your mind to it and this became this and that and the other.



December 23: John Cotton died in [Boston](#) and, according to Caleb Snow's A HISTORY OF BOSTON, THE METROPOLIS OF MASSACHUSETTS FROM ITS ORIGIN TO THE PRESENT PERIOD, WITH SOME ACCOUNT OF THE ENVIRONS, on the following night "strange and alarming signs appeared in the heavens."

A

Chronological TABLE

*Of the most remarkable passages in that part of
America, known to us by the name of NEW-
ENGLAND.*

Anno Dom.

1652. Mr. *John Cotton* Dyed.

COMET

ASTRONOMY

1654

In 1578, the physician Helisaeus Roeslin of Alsace, basing his prediction on a nova that had occurred in 1572, had foreseen the world as ending in this year in a blaze of fire. (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 240)

HERE COME DA JUDGE!

1655

Robert Hooke studied [astronomy](#) with Seth Ward. After he had assisted Thomas Willis in chemistry, Willis recommended him to Robert Boyle. He then assisted Boyle in the construction of an air pump.

July: Christiaan Huygens, using his new invention the compound eyepiece, made out what he took to be a "sombre band" across the face of the planet [Mars](#).

ASTRONOMY

1656

March 21: James Usher, Archbishop of Armagh, scholar, died at Reigate, Surrey.



1657

Pierre de Fermat of France enunciated the principle of “least time,” a principle consistent with Snell’s law of refraction according to which a ray of light knows to follow the path that will take it to its destination in the shortest time.

(But how is it able to figure out in advance which path is going to be the shortest and quickest? Does it have a built-in onboard supercomputer?)

Robert Hooke developing a way to make the pendulum of a clock unnecessary through the use of spiral springs, opening a way toward the development of a watch that might be carried in one’s pocket. (He explained succinctly that his spiral spring device amounted to a “circular Pendulum.”)

1658

In his *THE BOOK OF PROPHECIES*, Christopher Columbus maintained that the world had been created in 5,343 BCE, and would endure for a total of 7,000 years. Columbus was influenced by Pierre d'Ailly. Assuming that there would have been no Year Zero, this calculation indicated that the end would come in this year (McIver, Tom. *THE END OF THE WORLD: AN ANNOTATED BIBLIOGRAPHY*. Jefferson NC: McFarlane & Co., 1999 #77).

HERE COME DA JUDGE!

Bishop James Usher (1581-1656), Archbishop of Armagh, Primate of All Ireland, and Vice-Chancellor of Trinity College in Dublin, presented in this posthumous publication *THE ANNALS OF THE WORLD* that:



For as much as our Christian epoch falls many ages after the beginning of the world, and the number of years before that backward is not onely more troublesome, but (unless greater care be taken) more lyable to errour; also it hath pleased our modern chronologers, to adde to that generally received hypothesis (which asserted the Julian years, with their three cycles by a certain mathematical prolepsis, to have run down to the very beginning of the world) an artificial epoch, framed out of three cycles multiplied in themselves; for the Solar Cicle being multiplied by the Lunar, or the number of 28 by 19, produces the great Paschal Cycle of 532 years, and that again multiplied by fifteen, the number of the indiction, there arises the period of 7980 years, which was first (if I mistake not) observed by Robert Lotharing, Bishop of Hereford, in our island of Britain, and 500 years after by Joseph Scaliger fitted for chronological uses, and called by the name of the Julian Period, because it contained a cycle of so many Julian years. Now if the series of



ASTRONOMY

ASTRONOMY

the three minor cycles be from this present year extended backward unto precedent times, the 4713 years before the beginning of our Christian account will be found to be that year into which the first year of the indiction, the first of the Lunar Cycle, and the first of the Solar will fall. Having placed therefore the heads of this period in the kalends of January in that proleptick year, the first of our Christian vulgar account must be reckoned the 4714 of the Julian Period, which, being divided by 15. 19. 28. will present us with the 4 Roman indiction, the 2 Lunar Cycle, and the 10 Solar, which are the principal characters of that year.

We find moreover that the year of our fore-fathers, and the years of the ancient Egyptians and Hebrews were of the same quantity with the Julian, consisting of twelve equal months, every of them containing 30 days, (for it cannot be proved that the Hebrews did the Lunar Months, before the Babylonian Captivity) adjoining to the end of the twelfth month, the addition of five days, and every fourth year six. And I have observed by the continued succession of these years, as they are delivered in holy writ, That the end of the great Nebuchadnezzars, and the beginning of Evilmerodachs (his sons) reign, fell out in the 3442 year of the World, but by collation of Chaldean History and the Astronomical Canon, it fell out in the 186 year of Nabonassar, and, as by certain connexion, it must follow in the 562 year before the Christian account, and of the Julian Period, the 4152. and from thence I gathered the Creation of the World did fall out upon the 710 year of the Julian Period, by placing its beginning in Autumn: but for as much as the first day of the World began with the evening of the first day of the week, I have observed that the Sunday, which in the year 710 aforesaid, came nearest the Autumnal Equinox, by Astronomical Tables (p) notwithstanding the stay of the Sun in the days of Joshua, and the going back of it in the days of Ezekiah) happened upon the 23 day of the Julian October; from thence concluded that from the evening preceding, that first day of the Julian year, both the first day of the Creation and the first motion of time are to be deduced.

1659

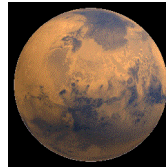
November 28: Christiaan Huygens saw the Syrtis Major feature of the surface of [Mars](#), and recorded it as a V-shaped marking.

ASTRONOMY

ASTRONOMY

ASTRONOMY

December 1: By repeated observations of that V-shaped marking which he had observed upon the face of [Mars](#) (now known as Syrtis Major), Christiaan Huygens was able to establish that the rotational period of the planet was rather similar to that of Earth.



ASTRONOMY

1660

Isaac Vossius pointed out that since [Chinese](#) records went back to 2,900 BCE, the Biblical chronology accepted in Europe could only be in error.

1663

James Gregory of England suggested that the astronomer might better cope with aberrations if a converging mirror were used as the objective of a telescope.

1664


October 25, Tuesday: When [John Evelyn](#) would speak in 1666-1667 in his PUBLICK EMPLOYMENT, &c. PREFER'D TO SOLITUDE of "spots in the sun" that were "easily discerned" by an available "optic," his astronomical metaphor may have had its origin in his visit to Oxford on this day of which he speaks in his DIARY, as he watched Boyle and Christopher Wren trying to observe the transit of Mercury across the sun's face. The projected image of the [sun](#) allows [sunspots](#) to be observed and he may have had the process explained to him then, or on some previous occasion.

SKY EVENT

John Evelyn's Diary

... I went to visite Mr. Boyle now here, whom I found with Dr. Wallis & Dr. Chr[istopher] Wren in the Tower at the Scholes, with an inverted Tube or Telescope observing the Discus of the Sunn for the passing of Mercury that day before the Sunn; but the Latitude was so greate, that nothing appeared: So we went to see the rarities in the Library, where the Library keepers, shewed me my name, among the Benefactors: They have a Cabinet of some Medails, & Pictures of the Muscular parts of Mans body: Thence to the new Theater, building now at an exceedingly & royal Expense by the L[ord] A[rch] B[ishop] of Canterbury, to keepe the Acts in for the future, 'til now being in St. Maries church: The foundation being but newly laied & the whole, Design'd, by that incomparable genius, & my worthy friend Dr. Chr[istopher] Wren, who shewed me the Model, not disdaining my advise in some particulars: Thence to see the Picture on the Wall over the Altar at All-Soules, being the largest piece of Fresco painting (or rather in Imitation of it, for tis in oyle [of Turpentine] in England, & not ill design'd, by the hand of one Fuller: yet I feare it will not hold long, & seemes too full of nakedes for a Chapell: Thence to New-Coll[ege] & the Painting of Magdalens Chapell, which is on blue cloth in Chiaro Oscuro by one Greeneborow, being a Cæna Domini & Judgement [on] the Wall by Fuller, as is the other, somewhat varied: Next to Waddam, & the Physik Garden where were two large Locust Trees, & as many Platana, & some rare Plants under the Culture of old Bobart.

THIS DAY IN PEPYS'S DIARY

In 1843,  during Thoreau's lifetime, a cycle of [sunspots](#) would be discovered and described.

ASTRONOMY



December 5: A [comet](#) was dominating the skies above New England, one which some would associate with the great plague and fire in London.

A

Chronological TABLE

*Of the most remarkable passages in that part of
America, known to us by the name of NEW-
ENGLAND.*

Anno Dom.

1664. The whole *Bible* Printed in the *Indian* Language finished.

The *Manadaes*, called New *Amsterdam*, now called New *York*; surrendred up to His Majesties Commiffioners (for the fettling of the respective Colonies in *New-England*, viz. Sir *Robert Carr*, Collonel *Nicols*, Collonel *Cartwright*, and Mr. *Samuel Mavericke*;) in *September*, after thirteen Dayes the Fort of *Arania*, now *Albania*; twelve Dayes after that, the Fort *Awfapha*; then *de la Ware* Castle Man'd with *Dutch* and *Sweeds*; the Three first Forts and Towns being Built upon the great River *Mohegan*, otherwise called *Hudsons* River.

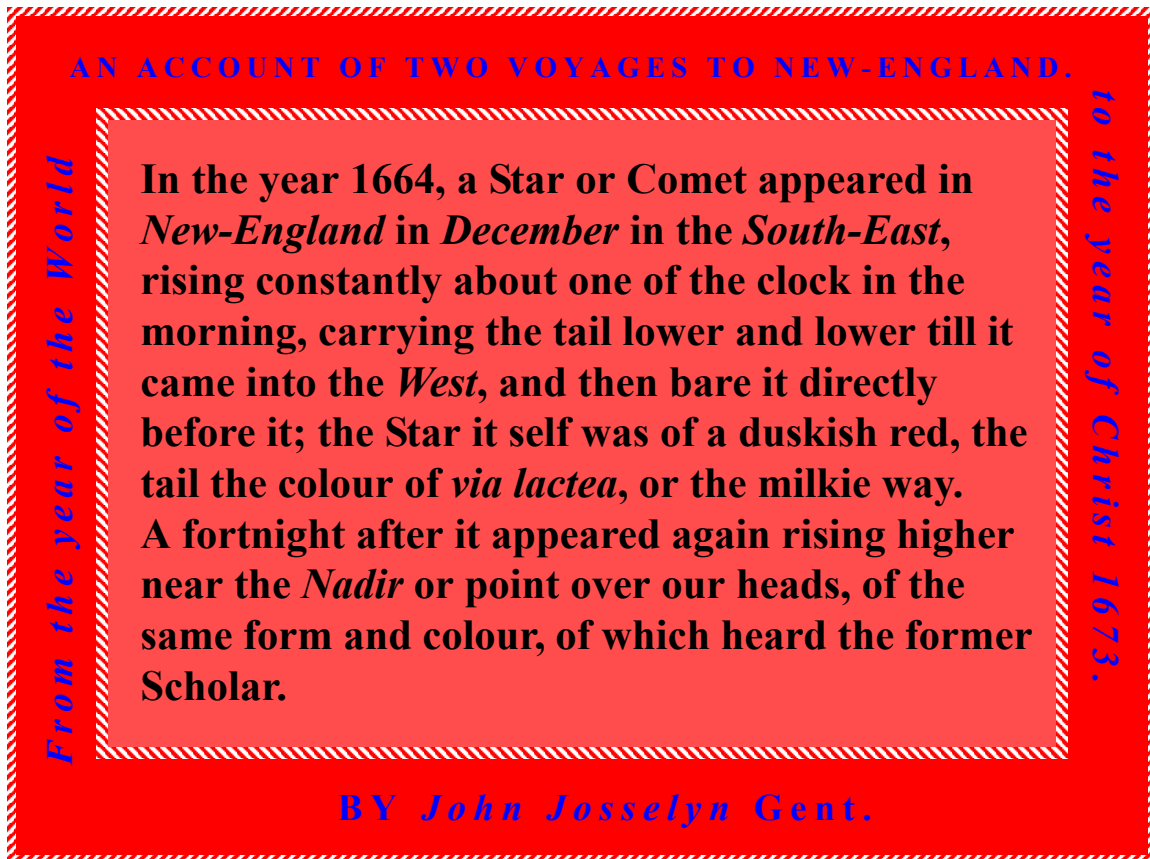
In *September* appeared a great Comet for the space of three Months.¹

¹ 1664, "December, a great and dreadful comet, or blazing star, appeared in the south-east in New England for the space of three moneths; which was accompanied with many sad effects, — great mildews blasting in the countrey the next summer." — *Josselyn's Voyages, Chronol. Obs.*, p. 273; and see p. 245 of the same for a fuller account. — Compare Morton's Memorial, by Davis, p. 304. As to the blasting and mildew of 1665, see the same, p. 317; and that of 1664, p. 309.

This comet seems to have begun to become visible at least to the more attentive of the skywatchers



as early as September, and would be apparent to the naked eye for about 75 days. On this day it completed its dive and began its outward journey:





ASTRONOMY

ASTRONOMY

AN ACCOUNT OF TWO VOYAGES TO NEW-ENGLAND.

From the year of the World

to the year of Christ 1673.

A friend of mine shewed me a small Treatise written and printed in the *Massachusetts-Bay* by *B.D.* intituled *An Astronomical description of the late Comet, or Blazing-Star, as it appeared in New-England in the Ninth, Tenth, Eleventh, and the beginning of the Twelfth moneth, 1664. printed at Cambridge by Samuel Green 1665.* An ingenious piece, but because I could not perswade my friend to part with it, I took out some short notes being straitned in time, which are as followes.... Some took note of it in the beginning of *November.*

BY *John Josselyn Gent.*

ASTRONOMY



"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."



— [Nathaniel Hawthorne](#), THE SCARLET LETTER

December 14: [John Evelyn](#)'s diary entry for this day was in part as follows:

ASTRONOMY

COMETS

John Evelyn's Diary

met at the R[oyal] Society, where we had severall letters read, from correspondents beyond sea, about the Comet which now appeared: orders were given for accurate observations to our Curator &c:

THIS DAY IN PEPYS'S DIARY

December 29: The great [comet](#) of this year at this point was apparently traveling through the constellation of Gemini and actually at its closest to the earth, 0.17 astronomical units away. Over the next few days it would be rapidly progressing through Taurus to Aries. It was being observed, among others, by Johannes Helvetius and Christiaan Huygens.

ASTRONOMY

1665

A news item relating to the development of ELECTRIC WALDEN technology:

- Robert Boyle learned that he could improve the focus of a small *camera obscura* by constructing it in the manner of a collapsing [telescope](#).

When the images of illuminated objects pass through a small round hole into a very dark room ... you will see on the paper all those objects in their natural shapes and colors. They will be reduced in size, and upside down.

— Leonardo da Vinci

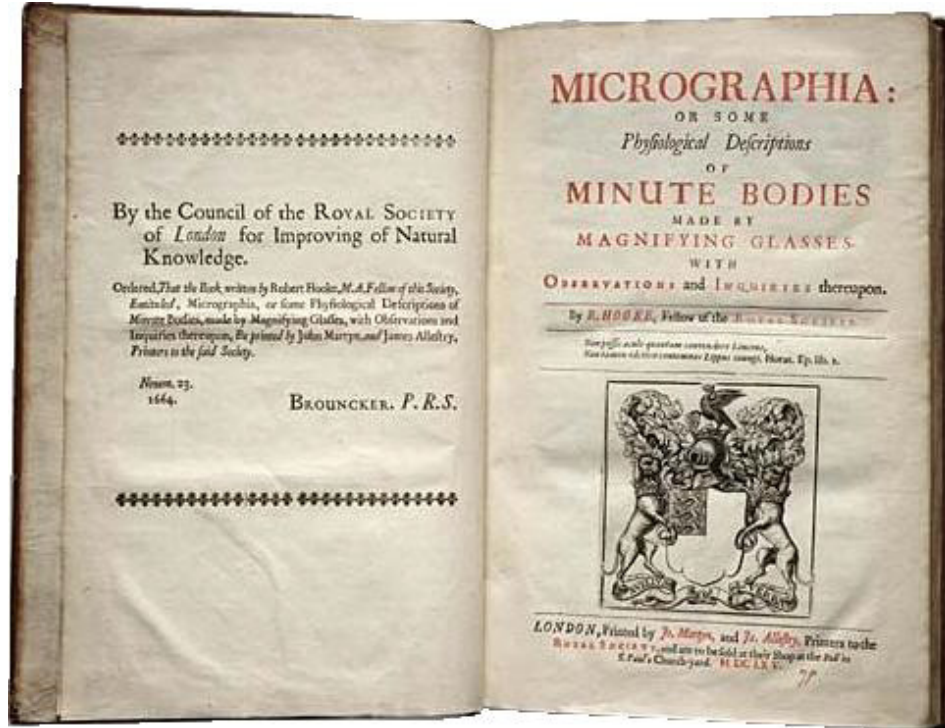
Athanasius Kircher, the inventor of the magic lantern which projects still pictures on the wall by means of a lens and transparent slides, wrote a story *MUNDUS SUBTERRANEUS*.



ASTRONOMY

ASTRONOMY

In this year in England Robert Hooke revealed that there be micro-monsters, in his *MICROGRAPHIA*, a book with elaborate drawings of various objects under the microscope, accompanied by an accessible prose commentary,



according to [Samuel Pepys](#) “the most ingenious booke that I ever read in my life.”

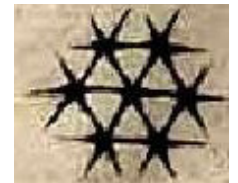
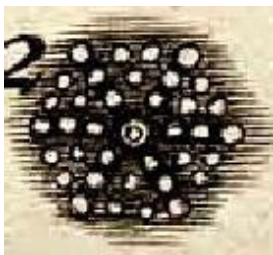
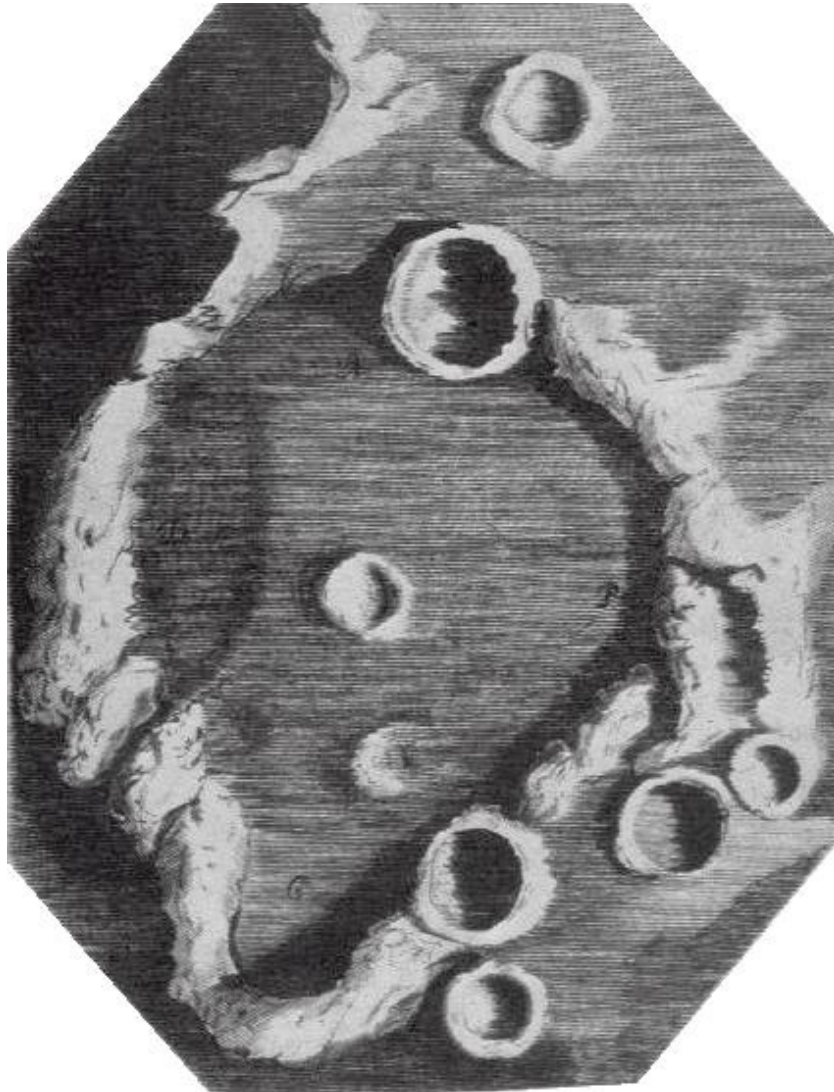
HISTORY OF OPTICS



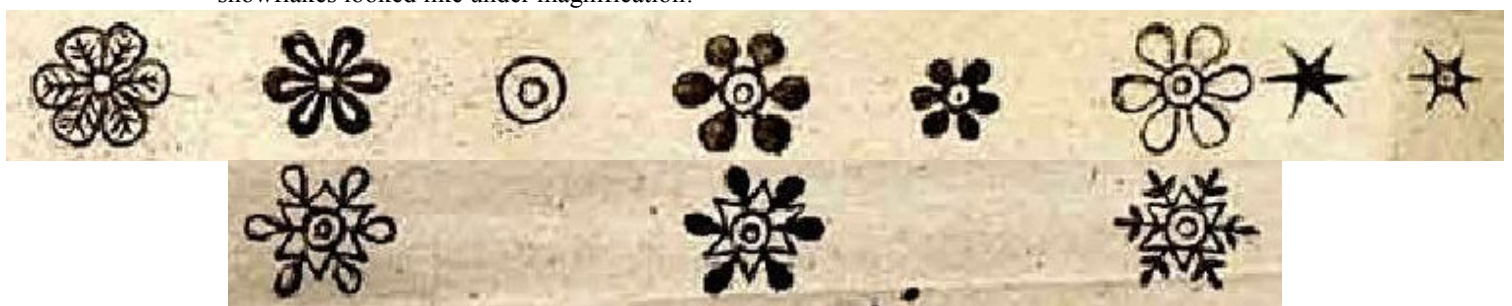
He was describing his observations with a compound microscope having a converging objective lens and a converging eye lens. He described his observations of the colours produced in flakes of mica, soap bubbles, and films of oil on water. He recognized that the color produced in mica flakes was related to their thickness but was unable to establish any definite relationship between thickness and color. He advocated a wave theory for the propagation of light. He also revealed to an amazed world what the crater Hipparchus on the moon would like to them if they had access to a 30-foot telescope:

ASTRONOMY

ASTRONOMY



This audience even got an opportunity to glimpse for the first time what such mundane objects as mere snowflakes looked like under magnification!





ASTRONOMY

ASTRONOMY

January 8: The great [comet](#) of 1664 at this point was apparently in the constellation of Aries, with its blue tail pointing toward the east.

SKY EVENT

[John Evelyn](#)'s diary entry for this day was in part as follows:

John Evelyn's Diary

I heard an excellent sermon in the chiefe Church on[e] Dr. Hynd, on 12: Rom: 6. The Major, & Officers of the Costomes were very civel to me:

THIS DAY IN PEPYS'S DIARY

March 27: First sighting of another great [comet](#).

ASTRONOMY

April 6: The great [comet](#) of this year had on the night of the 4th passed the orbit of the earth on its approach toward the sun, and at this point was in the constellation of Pegasus and was noted by the naked eye of Helvetius to be displaying a tail that was nearly 20 degrees long.

SKY EVENT

April 10-13: The tail of the great [comet](#) of this year was at this point 30 degrees in length.

SKY EVENT

ASTRONOMY

ASTRONOMY

April 20: The great [comet](#) of this year was seen for the last time, a few minutes after sunset. It may have appeared at this point to be about as bright as the planet Venus.

SKY EVENT



[John Evelyn](#)'s diary entry for this day was in part as follows:

John Evelyn's Diary

To White-hall, to the King, who call'd me into his Bed-Chamber as he was dressing, to whom I shew'd the Letter written to me from his R[oyal] Highness the Duke of York from the Fleete, giving me notice of Young Evertse, & some other considerable Commanders (newly taken in fight with the Dartmouth & Diamond fregats) whom he had sent me as Prisoners at Warr: I went to know of his Majestie how he would have me treat them: who commanded me to bring the Young Cap[tain] to him, &, to take the Dutch Ambassadors Word (who yet remained here) for the other; that he should render himselfe to me when ever I cald, & not stir without leave: Upon which I desired more Guards, the Prison being Chelsey house: I went also to my L[ord] Arlington (viz. Mr. Secretary Bennet, lately made a Lord) about another buisnesse; dined at my L[ord] Chancelors, none with him but Sir Sackvill Crow (formerly Ambassador at [Constantinople]) where we were very cherefull, & merry:

THIS DAY IN PEPYS'S DIARY

"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."



— [Nathaniel Hawthorne](#), THE SCARLET LETTER

April 24: This was the perihelion date of the great [comet](#) of this year, as calculated accurately at the time by Halley. The comet passed within 0.11 astronomical units of the [sun](#).

SKY EVENT

[John Evelyn](#)'s diary entry for this day was in part as follows:

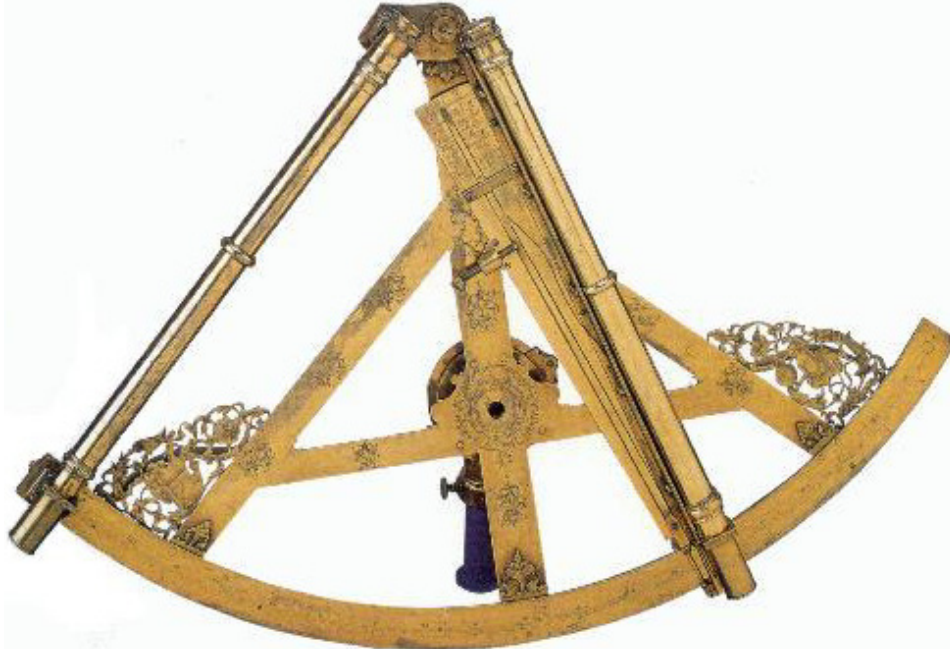
John Evelyn's Diary

I presented Young Cap[tain] Everse, eldest sonn of Cornelius, Vice-Admirall of Zealand, & Nephew of John now Admiral, a most valiant person, to his Majestie, being in his bed-chamber: the K[ing] gave his hand to kisse, gave him his liberty, asked many quest: concerning the fight (it being the first bloud drawne) his Majestie remembring the many civilities he had formerly received from his relations abroad, and had now so much Interest in that Considerable Province: Then I was commanded to go with him to the Holl: Ambassador, where he was to stay for his pass-port, & ordered me to give him 50 pieces in broad gold: Next day I had the Ambassadors Parole for the other Cap[tain] taken in Cap[tain] Allens fight [before] Cales &c:

THIS DAY IN PEPYS'S DIARY

1666

Robert Hooke published a work on the nature of [comets](#), entitled *COMETA*, detailing his close observation of the comets occurring in 1664 and 1665. Later in 1666, shortly after the Great Fire, he was appointed surveyor of London, to reestablish property lines and to supervise the rebuilding of London, along with his school chum Sir Christopher Wren, from 1666 to 1676. He would design many buildings including Montague House, the Royal College of Physicians, Bedlam, and Bethlem Hospital in Moorfields.⁴¹



Robert Hooke reported his development of “a perspective for observing the positions of stars from the moon by reflection.” This would in 1731 give John Hadley in England, and in about the same period give Thomas Godfrey in Philadelphia, the idea for replacing the nautical quadrant with an octant, in which optics and a



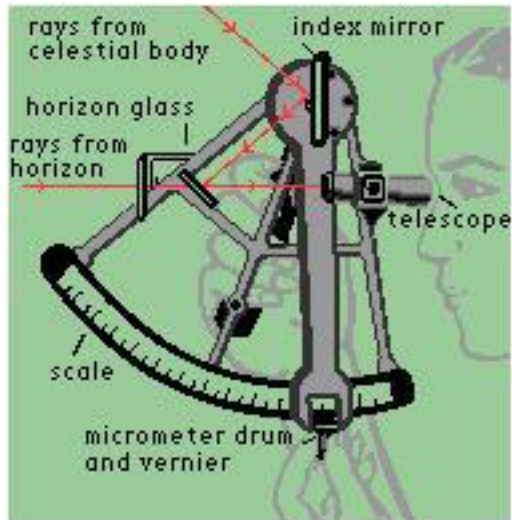
reflecting mirror are built into to the simple quadrant in order to bring a body in the heavens into coincidence with the horizon, transforming it into what amounted to a reflecting telescope.

⁴¹. There is more than a little conjunction between this appointment to heal the scars left by the great conflagration, and this treatise on the nature of comets — for there had just been a great [comet](#), and there was a widespread suspicion among the English that that comet had produced the great conflagration.

ASTRONOMY

ASTRONOMY

The [quadrant](#) (1st of the images above) and [octant](#) (2d of the images above) and eventually the [sextant](#) (below) would be used extensively in mapping.



CARTOGRAPHY

ASTRONOMY

ASTRONOMY

September 2: The great London fire began on Pudding Lane, in the house of the king's baker.

- 1660 Episcopacy restored in England and Scotland.
The people of Denmark, being oppressed by the nobles, surrender their privileges to Frederick III. who becomes absolute.
- 1662 The Royal Society established at London by Charles II.
- 1663 Carolina planted; 1728, divided into two separate governments.
- 1664 The New Netherlands, in North America, conquered from the Swedes and Dutch, by the English.
- 1665 The plague rages in London, and carries off 68,000 persons.
- 1666 The great fire of London began September 2, and continued three days, in which were destroyed 13,000 houses, and 400 streets.
Tea first used in England.
- 1667 The peace of Breda, which confirms to the English the New Netherlands, now known by the names of Pennsylvania, New York, and New Jersey.
St. James's Park planted, and made a thoroughfare for public use, by Charles II.
- 1670 The English Hudson's Bay company incorporated.
- 1672 Louis XIV. over-runs great part of Holland, when the Dutch open their sluices, being determined to drown their country, and retire to their settlements in the East Indies.
African company established.
- 1678 The peace of Nimeguen.
The habeas corpus act passed.
- 1680 A great comet appeared, and from its nearness to our earth, alarmed the inhabitants. It continued visible from November 3 to March 9.
William Penn, a Quaker, receives a charter for planting Pennsylvania.
- 1683 India stock sold from 360 to 500 per cent.
- 1685 Charles II. dies, aged 55, and is succeeded by his brother James II.
The duke of Monmouth, natural son to Charles II. raises a rebellion, but is defeated at the battle of Sedgmoor, and beheaded.
The edict of Nantes infamously revoked by Louis XIV. and the Protestants

[John Evelyn](#)'s diary entries for this day were in part as follows:

John Evelyn's Diary

This fatal night about ten, began that deplorable fire, neere Fish-streete in Lond[on]



John Evelyn's Diary

I had pub: prayers at home: after dinner the fire continuing, with my Wife & Sonn took Coach & went to the bank side in Southwark, where we beheld that dismal speectaccle, the whole Citty in dreadfull flames neere the Water side, & had now consumed all the houses from the bridge all Thames Streete & up-wards towards Cheape side, downe to the three Cranes, & so returned exceedingly astonishd, what would become of the rest:

By September the 5th, this great fire would have reduced $\frac{4}{5}$ ths of the city to ashes. Only the northeast corner, and the extreme west end, of the city would remain intact. This was, however, a property fire with ample warning: there would be relatively little loss of life. Instead of horror the fire would inspire humor, as for instance in 1693 when a joke book would point out that Cannon Street had roared, Wood Street had burnt to Ashes, Bread Street had burnt to a Coal, Pie Corner had over bak'd, and Snow Hill had melted down.

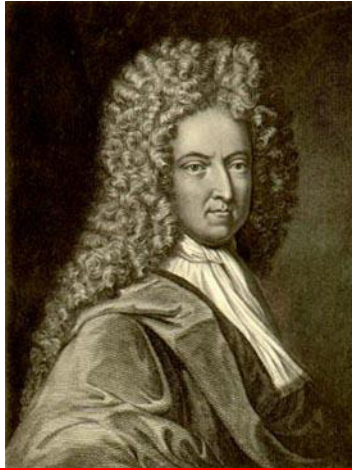
There had just been a great [comet](#), and so there was a widespread belief that the great comet had brought the great conflagration. Even as late as 1722, [Daniel Defoe](#) would be referring to this suspicion in his A JOURNAL

ASTRONOMY

ASTRONOMY

OF THE PLAGUE YEAR.

SKY EVENT



THIS DAY IN PEPYS'S DIARY

1667

Lieutenant Colonel Jean de Martinet became the first Inspector General of the French Army. His job was to instruct French soldiers in the Dutch manner. (That is, in close order drill and volleyed musketry.) The savage pleasure that he took in his work has since become legendary.

The Spanish reduced Quilmes, the final important Inca fortress in the Andes.

During this year Robert Hooke explained the scintillation of stars.

June 12, Wednesday: Robert Hooke discoursed before the Royal Society on the effect of earthquakes.

THIS DAY IN PEPYS'S DIARY

September 19: Robert Hooke exhibited a model for the rebuilding of the City of London after the Great Fire. Although his plan would not be adopted, the City authorities would appoint him a City Surveyor together with Edward Jerman and Peter Mills. To these the King would add by his own appointment Christopher Wren, Hugh May, and Roger Pratt. Hooke would design the Bethlehem Hospital (Bedlam), Montague House, and the Royal College of Physicians –all of which would during the 19th Century be demolished– and Ragley Hall in Warwickshire, and, for his old Headmaster at Westminster, Willen Church in Buckinghamshire.



1668

Hans Lippershey (1570-1619), a German-born lens maker in the Netherlands, had applied for a patent for an optical refracting telescope, made from two lenses, a converging objective lens and a diverging eye lens, fully sixty years earlier, intending his invention for warfare. Galileo had soon redirected this war device toward the heavens. However, it soon became apparent that this device suffered from a major limitation very similar to the design mistake of the original Hubble space telescope: chromatic aberration caused its images to be fuzzy as light of different colors came to a focus at the wrong focal lengths. The problem had persisted for fully sixty years, but in this year [Isaac Newton](#) was able to develop a device using one lens and a mirror, the optical reflecting telescope, that for the 1st time corrected this most salient design flaw.

HISTORY OF OPTICS

March 1: In this year there was a great [comet](#), the 3d to appear within a 5-year span. This one was probably a Kreutz sungrazer, passing on this day within 0.01 astronomical units of the surface of the sun.

SKY EVENT

March 3: The initial observation, from the Cape of Good Hope, of the great [comet](#) of this year, as it passed through the skies of our Southern Hemisphere.

SKY EVENT

March 10: The tail of the great [comet](#) of this year stretched about 30 degrees across the skies of the Southern Hemisphere and was visible even from [Italy](#).

SKY EVENT

March 18: Observers in [China](#) noted that the tail of the great [comet](#) of this year was stretching over 40 degrees across the constellation of Eridanus.

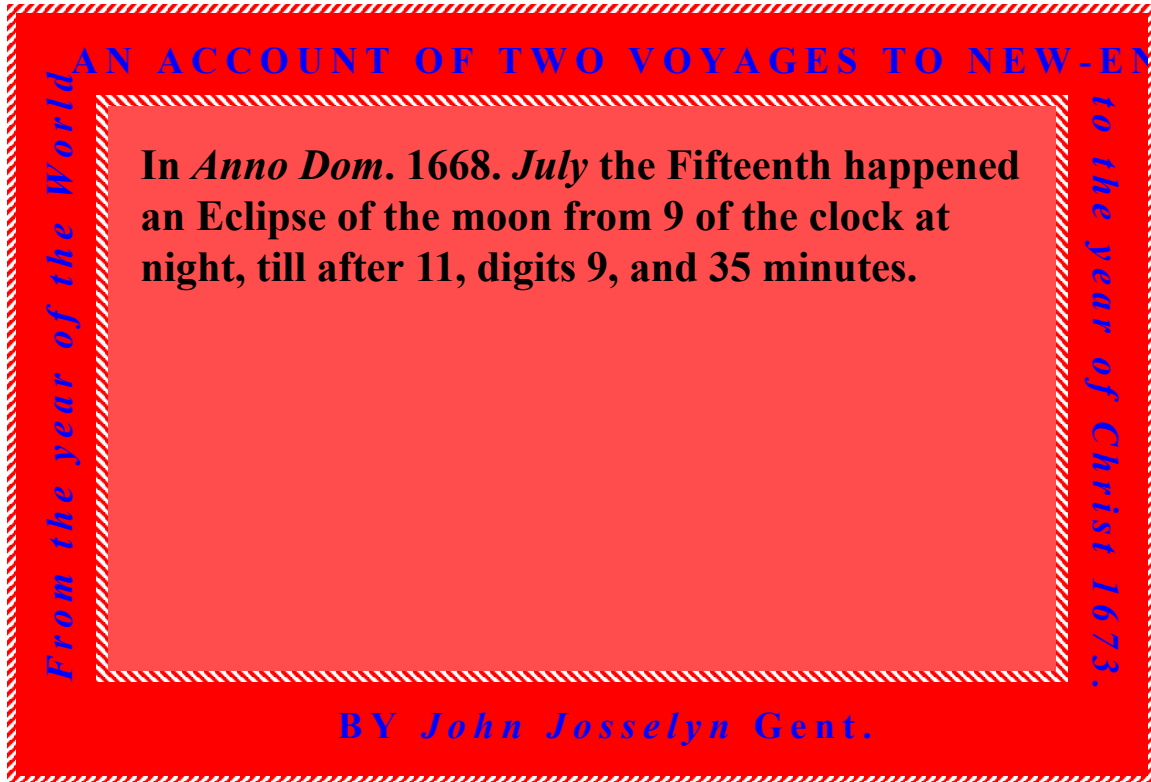
SKY EVENT

"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER



July 15: Lunar [eclipse](#) in New England:



“Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural

SKY EVENT

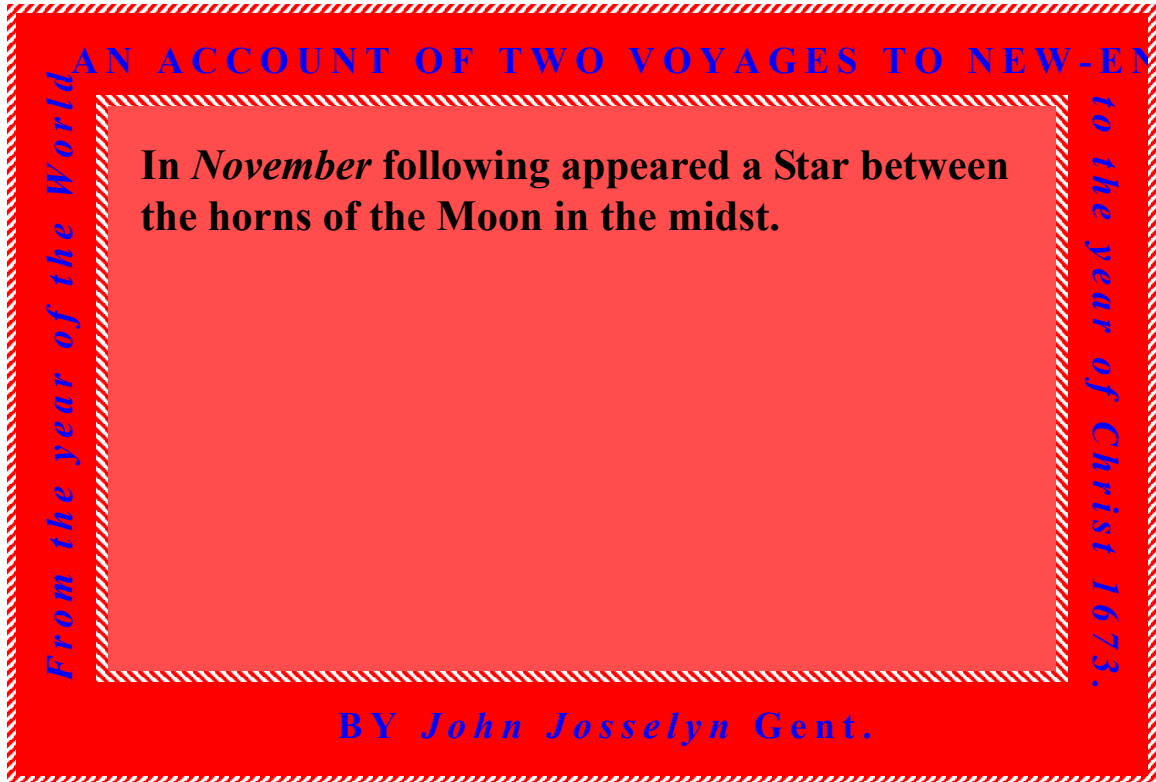


phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement to the revolutionary times, of which the inhabitants had not been previously warned by some spectacular nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faintly eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness.”



— [Nathaniel Hawthorne](#), THE SCARLET LETTER

November: Was a volcanic eruption observed to be occurring on the [moon](#)?⁴²



SKY EVENT

1669

Erasmus Bartholinus of Denmark discovered double refraction in calcite.

HISTORY OF OPTICS

42. The Reverend [Cotton Mather](#) would communicate this observation to the Royal Society, and in 1798 Samuel Taylor Coleridge would take note of the strange event in “The RIME OF THE ANCIENT MARINER”:

The stars were dim, and thick the night,
The steersman's face by his lamp gleamed white;
From the sails the dew did drip—
Till clombe above the eastern bar
The horned Moon, with one bright star
Within the nether tip.

1670

Isaac Newton and G.W. von Leibnitz independently gave the world the calculus.

Robert Hooke in the Cutlerian Lectures described his attempts to measure the parallax of a fixed star.



1671

With a few deft twists of his wrist, the Reverend Professor [Ralph Cudworth](#), longtime opponent of Thomas Hobbes, finished his fantasy, THE TRUE INTELLECTUAL SYSTEM OF THE UNIVERSE. Of the three great refutations of false ideas which for him summed up all religious and moral truth, in this work he had gone to the mattresses on behalf of the first:

- the atomistic materialism of Democritus and Epicurus was quite mistaken, because reality consisted of a supreme divine intelligence and a spiritual world
- all pantheistic naturalism was quite mistaken, and all stoicism had been quite mistaken, because humans have complete moral freedom and responsibility (he would beat this to death in his TREATISE ON FREE WILL)
- the medieval Nominalists and their successors were quite mistaken, because moral ideas possessed an eternal reality (he would flog this in his TREATISE ON ETERNAL AND IMMUTABLE MORALITY)





ASTRONOMY

ASTRONOMY

February 2, day: [Harvard College](#) was given a “3 foote and a halfe with a concave ey-glasse” reflecting [telescope](#). This would be the instrument with which the Reverends Increase and [Cotton Mather](#) would observe a bright [comet](#) of the year 1682.

ASTRONOMY
HALLEY’S COMET
HARVARD OBSERVATORY

October 25: Saturn’s [moon](#) Iapetus was discovered by Giovanni Cassini.

ASTRONOMY

1672

June 13: Friend [George Fox](#) had returned from Long Island to [Maryland](#) shore, and then had embarked on a longer journey, arriving on this day at Rhode Island (that’s merely a moderately sized island in [Narragansett Bay](#), rather than the extensive “Providence Plantations” affiliated with it on the mainland shore which are now referred to collectively as the “State of [Rhode Island](#) and Providence Plantations”). George Bishop’s NEW ENGLAND JUDGED says the New England [Yearly Meeting](#) which he was visiting on this island had been in existence since 1661.



After Friends were gone to their several habitations, we stayed some days upon the island; had meetings in several parts thereof, and good service for the Lord. When we were clear of the island, we returned to Oyster Bay, waiting for a wind to carry us to Rhode Island, which was computed to be about two hundred miles. As soon as the wind served, we set sail. We arrived there on the thirtieth day of the Third month, and were gladly received by Friends. We went to the house of Nicholas Easton, who at that time was governor of the island; where we rested, being very weary with travelling.

On First-day following we had a large meeting, to which came the deputy-governor and several justices, who were mightily affected with the Truth. The week following, the Yearly Meeting for all the Friends of New England and the other colonies adjacent, was held in this island; to which, besides very many Friends who lived in those parts, came John Stubbs from Barbadoes, and James Lancaster and John Cartwright from another way.

This meeting lasted six days, the first four days being general public meetings for worship, to which abundance of other people came. For they having no priest in the island, and so no restriction to any particular way of worship; and both the governor and deputy-governor, with several justices of the peace, daily frequenting the meetings; this so encouraged the people that they flocked in from all parts of the island. Very good service we had amongst them, and Truth had good reception.

I have rarely observed a people, in the state wherein they stood, to hear with more attention, diligence, and affection, than generally they did, during the four days; which was also taken notice of by other Friends. These public meetings over, the men's meeting began, which was large, precious, and weighty. The day following was the women's meeting, which also was large and very solemn.

These two meetings being for ordering the affairs of the Church, many weighty things were opened, and communicated to them, by way of advice, information, and instruction in the services relating thereunto; that all might be kept clean, sweet and savoury amongst them. In these, several men's and women's meetings for other parts were agreed and settled, to take care of the poor, and other affairs of the Church, and to see that all who profess Truth walk according to the glorious gospel of God.

** When this great general meeting was ended, it was somewhat hard for Friends to part; for the glorious power of the Lord, which was over all, and His Blessed Truth and life flowing amongst them, had so knit and united them together, that they spent two days in taking leave one of another, and of the Friends of the island; and then, being mightily filled with the presence and power of the Lord, they went away with joyful hearts to their several habitations, in the several colonies where they lived.*



When Friends had taken their leave one of another, we, who travelled amongst them, dispersed ourselves into our several services, as the Lord ordered us. John Burnyeat, John Cartwright, and George Pattison went into the eastern parts of New England, in company with the Friends that came from thence, to visit the particular meetings there; whom John Stubbs and James Lancaster intended to follow awhile after, in the same service; but they were not yet clear of this island. Robert Kidders and I stayed longer upon this island; finding service still here for the Lord, through the great openness and the daily coming in of fresh people from other colonies, for some time after the general meeting; so that we had many large and serviceable meetings amongst them.

During this time, a marriage was celebrated amongst Friends in this island, and we were present. It was at the house of a Friend who had formerly been governor of the island: and there were present three justices of the peace, with many others not in profession with us. Friends said they had never seen such a solemn assembly on such an occasion, or so weighty a marriage and so comely an order. Thus Truth was set over all. This might serve for an example to others; for there were some present from many other places.

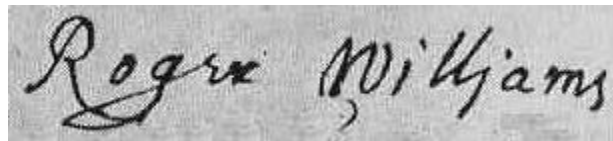
* After this I had a great travail in spirit concerning the Ranters in those parts, who had been rude at a meeting at which I was not present. Wherefore I appointed a meeting amongst them, believing the Lord would give me power over them; which He did, to His praise and glory; blessed be His name for ever! There were at this meeting many Friends, and diverse other people; some of whom were justices of the peace, and officers, who were generally well affected with the Truth. One, who had been a justice twenty years, was convinced, spoke highly of the Truth, and more highly of me than is fit for me to mention or take notice of.

Then we had a meeting at Providence, which was very large, consisting of many sorts of people. I had a great travail upon my spirit, that it might be preserved quiet, and that Truth might be brought over the people, might gain entrance, and have a place in them; for they were generally above the priest in high notions; and some of them came on purpose to dispute. But the Lord, whom we waited upon, was with us, and His power went over them all; and His blessed Seed was exalted and set above all. The disputers were silent, and the meeting was quiet and ended well; praised be the Lord! The people went away mightily satisfied, much desiring another meeting.

Friend [George Fox](#) did not meet the Reverend [Roger Williams](#) in [Providence](#), though that local VIP had debated with Friend John Burnyeat during his visit to [Newport](#) in 1671. After Fox and his companion, Friend Nicholas Easton, had left Providence and had gone back down the Bay, and had left there as well and was sailing back toward Long Island, the Reverend Williams would row over to Newport, some 30 miles despite his advanced age — but he would miss being able to issue his challenge to a debate with the main man.

The Reverend Williams would attempted to debate instead with Friends [William Edmundson](#), John Stubbs, and John Burnyeat. The debate would not go well, as Friend Henry Nichols would sing persistently and loudly, and Friend Ann Eaton would pray loudly and persistently, attempting to drown out the Reverend Williams's voice.

RELIGIOUS SOCIETY OF FRIENDS



1672. Roger Williams held a public disputation with three Friends or Quakers, which continued three days at Newport and one in Providence. Deputies or members of the General Assembly were for the first time required to take an oath or affirmation on commencing their official duties. This was protested against by those of Providence.

After two days of such proceedings, there had been an [eclipse](#) of the sun as the debate came to an end.

ASTRONOMY

"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER





ASTRONOMY

ASTRONOMY

The Reverend would then write, and publish in Boston in 1676, what Fox elsewhere would term “Roger Williams’s ‘Book of Lyes,’” a book bearing the amusing title *GEORGE FOX DIGGED OUT OF HIS BURROWS* (reprinted in *PUBLICATIONS OF THE NARRAGANSETT CLUB*, Volume V, pages xx-xlv, Providence, 1872). When Fox and Burnyeat would reply to said “slandrous book” in a 65-page pamphlet, *A NEW ENGLAND FIRE BRAND QUENCHED*, Fox would seem not even to be sure exactly where the Reverend Williams, that famous “apostle of soul liberty,” was flourishing, as in this pamphlet he would refer to the Reverend as “a priest of New England (or some colony thereabouts).”

This place (called Providence) was about thirty miles from Rhode Island; and we went to it by water. The Governor of Rhode Island, and many others, went with me thither; and we had the meeting in a great barn, which was thronged with people, so that I was exceedingly hot, and in a great sweat; but all was well; the glorious power of the Lord shone over all; glory to the great God for ever!

After this we went to Narragansett, about twenty miles from Rhode Island; and the Governor went with us. We had a meeting at a justice’s house, where Friends had never had any before. It was very large, for the country generally came in; and people came also from Connecticut, and other parts round about, amongst whom were four justices of the peace. Most of these people had never heard Friends before; but they were mightily affected with the meeting, and a great desire there is after the Truth amongst them; so that our meeting was of very good service, blessed be the Lord for ever!

The justice at whose house the meeting was, and another justice of that country, invited me to come again; but I was then clear of those parts, and going towards Shelter Island. But John Burnyeat and John Cartwright, being come out of New England into Rhode Island, before I was gone, I laid this place before them; and they felt drawings thither, and went to visit them.

*At another place, I heard some of the magistrates say among themselves that if they had money enough, they would hire me to be their minister. This was where they did not well understand us, and our principles; but when I heard of it, I said, “It is time for me to be gone; for if their eye were so much on me, or on any of us, they would not come to their own Teacher.” For this thing (hiring ministers) had spoiled many, by hindering them from improving their own talents; whereas our labour is to bring every one to his own Teacher **in** himself.*

I went thence towards Shelter Island [so named because Nathaniel Sylvester, sole proprietor of this island at the eastern end of Long Island between Gardiner’s Bay and Little Peconic Bay, had offered shelter to persecuted Friends from New England], having with me Robert Widders, James Lancaster, George Pattison, and John Jay, a planter of Barbadoes.

We went in a sloop; and passing by Point Juda [Judith] and Block Island, we came to Fisher’s Island, where at night we went on shore; but were not able to stay for the mosquitoes which abound there, and are very troublesome. Therefore we went into our sloop again, put off for the shore, and cast anchor; and so lay in our sloop that night.

Next day we went into the Sound, but finding our sloop was not able to live in that water, we returned again, and came to anchor before Fisher’s Island, where we lay in our sloop that night also. There fell abundance of rain, and our sloop being open, we were exceedingly wet.



ASTRONOMY

ASTRONOMY

Next day we passed over the waters called the Two Horse Races, and then by Gardner's Island; after which we passed by the Gull's Island, and so got at length to Shelter Island. Though it was but about twenty-seven leagues from Rhode Island, yet through the difficulty of passage we were three days in reaching it.

The day after, being First-day, we had a meeting there. In the same week I had another among the Indians; at which were their king, his council, and about a hundred Indians more. They sat down like Friends, and heard very attentively while I spoke to them by an interpreter, an Indian that could speak English well. After the meeting they appeared very loving, and confessed that what was said to them was Truth.

Next First-day we had a great meeting on the island, to which came many people who had never heard Friends before. They were very well satisfied with it, and when it was over would not go away till they had spoken with me. Wherefore I went amongst them, and found they were much taken with the Truth; good desires were raised in them, and great love. Blessed be the Lord; His name spreads, and will be great among the nations, and dreadful among the heathen.

While we were in Shelter Island, William Edmundson, who had been labouring in the work of the Lord in Virginia, came to us. From thence he had travelled through the desert-country, through difficulties and many trials, till he came to Roanoke [not little Roanoke Island off the coast, but the extensive mainland adjacent to the Roanoke River], where he met with a tender people. After seven weeks' service in those parts, sailing over to Maryland, and so to New York, he came to Long Island, and so to Shelter Island; where we met with him, and were very glad to hear from him the good service he had had for the Lord, in the several places where he had travelled since he parted from us.

We stayed not long in Shelter Island, but entering our sloop again put to sea for Long Island. We had a very rough passage, for the tide ran so strong for several hours that I have not seen the like; and being against us, we could hardly get forwards, though we had a gale.

We were upon the water all that day and the night following; but found ourselves next day driven back near to Fisher's Island. For there was a great fog, and towards day it was very dark, so that we could not see what way we made. Besides, it rained much in the night, which in our open sloop made us very wet.

Next day a great storm arose, so that we were fain to go over the Sound, and got over with much difficulty. When we left Fisher's Island, we passed by Falkner Island, and came to the main, where we cast anchor till the storm was over.

Then we crossed the Sound, being all very wet; and much difficulty we had to get to land, the wind being strong against us. But blessed be the Lord God of heaven and earth, and of the seas and waters, all was well.



FOX'S JOURNAL

ROANOKE



ASTRONOMY

ASTRONOMY

Oh! how darest thou Roger Williams, publish such false lyes to the World, when thou knowest in thy Conscience, that G.F. had never any Writing, or Letter, or Proposals from thee; neither did he ever exchange a word with thee. The Lord God of Heaven knowes it, and the Deputy Governour knowes, that I received none of thy Writings or Papers or Proposals by him. Behold all sober people the foundation of this mans Attempt, the beginning of his work; and since the foundation of thy Book is a notorious lye, the building upon such a foundation of lyes is not like to be otherwise: which lyes thou hast made thy refuge; as throughout thy Book may be evidently seen. For except a man had sold himself to work falsehood, and make lyes; he could not have done more wickedly, and have uttered falser charges that though hast done. But the Lord God which knows them, and sees thy evil design in them, will sweep them away with the besom of Destruction, and clear his people from thy manifest false tongue....

But by this all may see the wickedness, that is in the Bottle of this R.W. by what does flow out of it in his Book, to wit, a malicious spirit against G.F. who was never concerned him by word or writing, much less did G.F. ever do him wrong. And yet he says, G.F. well knew, what Artillery he was furnisht with out of his own bald writings, (as he scoffingly calls them) &c. when never a word of this is true: though he presumes to present it to the King for Truth concerning G.F....

This also is an abominable falsehood, the Lord know it, a groundless untrue imagination of his own; for there was no such Agreement or Consultation. Is this man fit to write of Religion, that lyes? a vain man! What is he, and his designs, that they should require Consultations and Junctos? so let the honest Reader Judge, from whence R.W. had all these lyes, if not from his Father the Devil, who is out of Truth: but with the Truth is both his Father and he Judged.

December 23: Saturn's [moon](#) Rhea was discovered by Giovanni Cassini.

ASTRONOMY

1674

A news item relating to the development of ELECTRIC WALDEN technology:

- In [Germany](#), G.W. von Leibnitz, now known more for his metaphysical and ontological speculations as well as for the co-invention of the calculus, developed the first mechanism for multiplying and dividing, his "Stepped Reckoner." This uses a movable carriage so that it can multiply, with operands of up to 5 and 12 digits and a product of up to 16. But its carry mechanism

requires user intervention and doesn't really work in all cases anyway. The calculator was powered by a graduate student turning a crank.



Robert Hooke's "An Attempt to Prove the Motion of the Earth by Observations" recorded the 1st observation of a star in daylight.

Robert Hooke became embroiled in a controversy with Helvetius, author of *MACHINA CELESTIS*. In his series of Cutlerian Lectures, Hooke characterized Helvetius's writing as "curious and pompous."

Robert Hooke constructed the 1st Gregorian telescope.

1675

There was a dispute between Robert Hooke and the Dutch scientist Huygens concerning the invention of the balance-spring watch, caused by the fact that in 1658 when Hooke had completed this apparatus, he had not been satisfied with the patent arrangements that were being negotiated on his behalf and had therefore continued to hold the details of his design as a trade secret. Hooke had, however, in his *DESCRIPTION OF HELIOSCOPES* in 1657 and 1658, documented what he had been up to by including in a postscript a mention of his balance spring.

ASTRONOMY

ASTRONOMY

February 5: Sir [Isaac Newton](#) wrote to a fellow natural philosopher, the short hunchback Robert Hooke — a man whose physique has been described by his biographers as “something crooked” — and ridiculed both his pretensions to science and his personal physical problems.



Adapting a line about African pygmies from the then-famous book *ANATOMY OF MELANCHOLY*, Newton said of himself “If I have seen further, it is by standing on the shoulders of giants.” Since Hooke was famous for having built the 1st reflecting [telescope](#), decidedly a device for seeing farther by means of a shorter tube, in such a remark Newton would have been read as deliberately ridiculing him and his pretensions, to his face. He was in effect signaling that “I am such a great theoretical scientist as to need no assistance from an equipment-building dwarf like you — you can take your glorified little reflection-tube and shove it up your kinky little ass.” (Taken out of context, this catty and cutting and entirely unnecessary remark would be misinterpreted down through the ages — as an expression of the great Newton’s personal modesty.)

June 26: The troops of the Massachusetts Bay colony marched to the assistance of the Plymouth colony troops at [Swansea](#). There was a total [eclipse](#) of the [moon](#), which was understood by the whites to be a natural event but nevertheless was nothing that made them feel any better about anything, and was understood by the reds to be an omen of bloodshed.⁴³

“KING PHILLIP’S WAR”

SKY EVENT

43. From Sachem [Metacom](#)’s standpoint, this lunar [eclipse](#) was straightforwardly an omen of war. It sure didn’t produce the war, any more than a strange obscurement of the sun in February 1831 would produce Nat Turner’s rebellion, but, in both cases — these sky events would definitely impact on the **timing** of the hostilities.

SKY EVENT

"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER



1676

Olaf Römer of Denmark inferred from detailed observations of the eclipses of the moons of Jupiter that the speed of light must be finite. From the data he obtained a value of about 2×10^8 meters/second⁻¹. From this year on, Jupiter's moons would be used extensively worldwide to assist in the determination

HISTORY OF OPTICS

of the [longitude](#) of ships at sea.

ASTRONOMY

CARTOGRAPHY

[Edmond Halley](#) was for six weeks the guest of the East India Company at their St. Helena colony in the South Atlantic for purposes of observation of the exceedingly rare transit of the planet Venus across the face of the sun. He spent most of his period on the island studying and theorizing about its hydrological cycle, upon the basis of a concept of recirculating fluid which had quite possibly been inspired by Harvey's 1630s discovery of the recirculation of the body's blood. We were on our way toward a new formal science in which we would not only be able to think of the planet's surface phenomena as constituting a single self-regulating system, but also toward an abstract science of the cybernetics of self-regulating systems, neither of which had been latent within earlier patterns of thought.

SKY EVENT



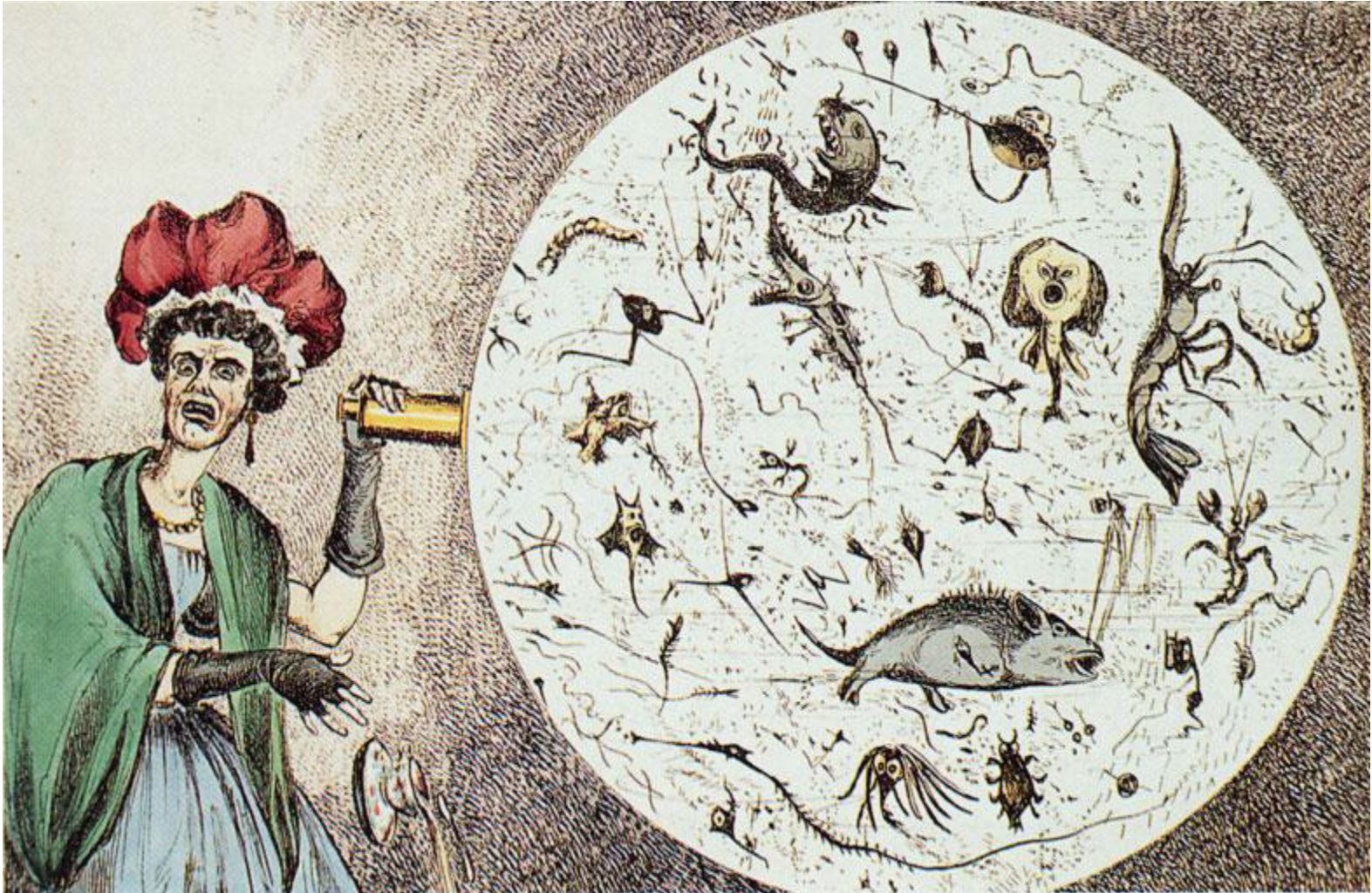
Halley's cybernetic recirculation study constitutes one of the first systematic evaluations of environmental processes and, like all others subsequent to that date, since it points in the direction of inherent limits upon exploitation rather than toward enhanced opportunities for exploitation — has been entirely ignored.

Geminiano Montanari claimed to have sighted a [meteor](#) which was making a sound. He alleged that the sound it made was like "the rattling of a great Cart running over Stones." Since he was an astronomer, he was able to calculate that the altitude of the meteor, while he was hearing this curious rattling noise, was 38 miles.

ASTRONOMY

ASTRONOMY

December 25: A Dutchman named Antonie Thonisoon, who had changed his name to van Leeuwenhoek in order to rise in the world, wrote to the Royal Society in London to report that he had been able to grind a lens which produced a magnification factor of 500, and that through this lens he had been able to observe minute creatures, 30 million of which would fit on the surface of one grain of sand.





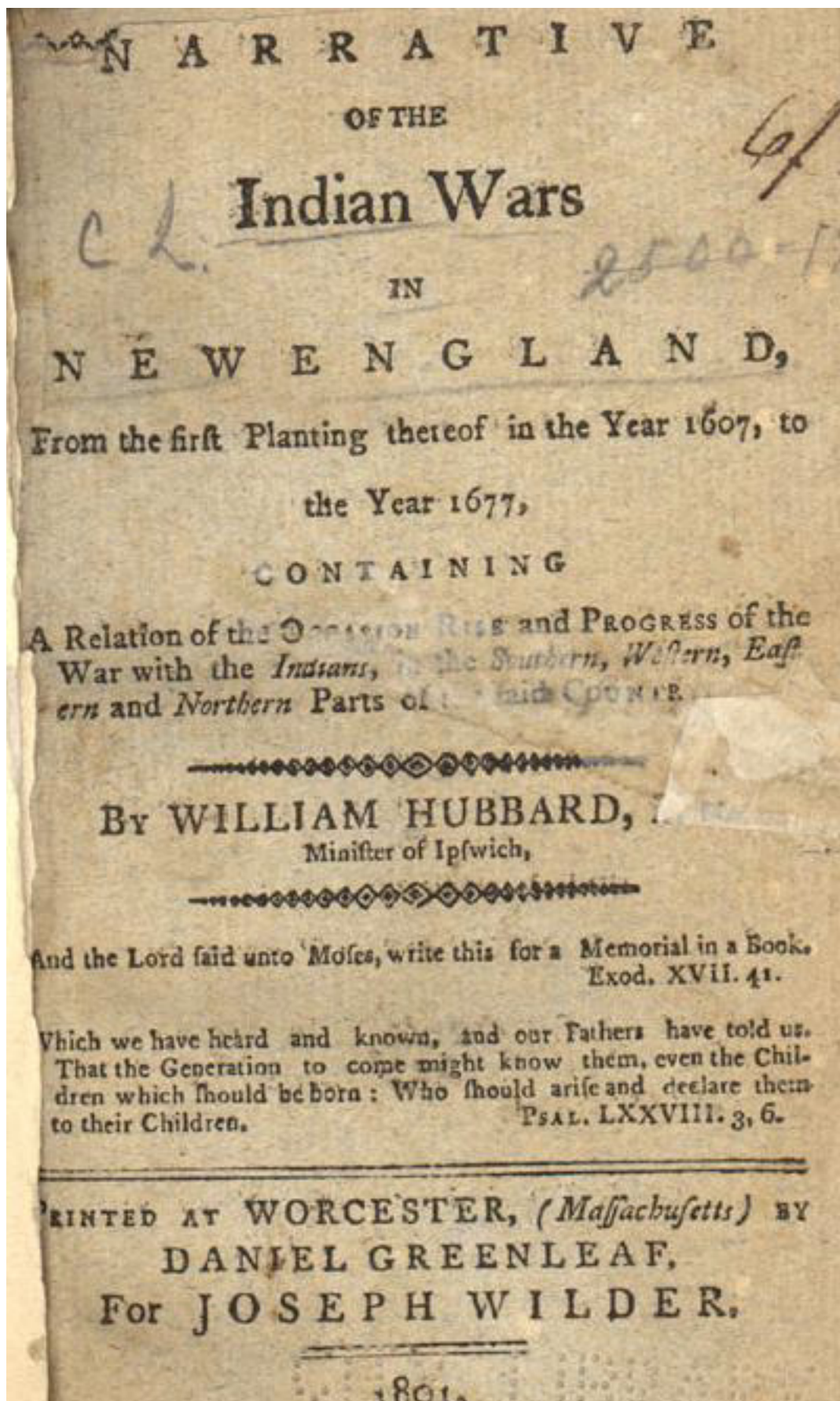
1677

[Edmond Halley](#) cataloged the star Eta Carinae as one of only the 4th magnitude. (In April 1843 it would suddenly become for a period the second brightest star in the sky, and then by 1868 it would have faded to the point at which it would no longer be visible to the naked eye.) Also, in this year, the Reverend William Hubbard of Ipswich issued his A NARRATIVE OF THE TROUBLES WITH THE INDIANS IN *NEW-ENGLAND*, FROM THE FIRFT PLANTING THEREOF IN THE YEAR 1607, TO THIS PRESENT YEAR 1677. BUT CHIEFLY OF THE LATE TROUBLES IN THE TWO LAFT YEARS, 1675, AND 1676. TO WHICH IS ADDED A DIFCOURFE ABOUT THE *WARRE* WITH THE PEQUODS IN THE YEAR 1637.⁴⁴



Here, then, was the solution to the colonists' dilemma ... wage the war, and win it, by whatever means necessary, and then write about it, to win it again. The first would be a victory of wounds, the second a victory of words.

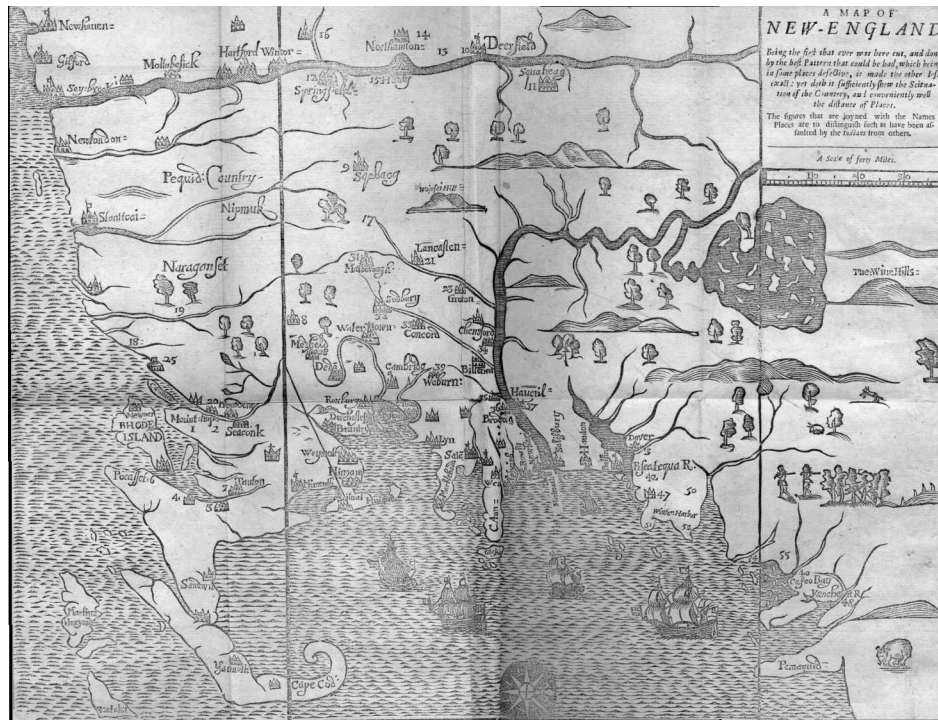
44. This was the title as printed in Boston. The book would be reprinted in England in the same year with a slightly different title.



ASTRONOMY

ASTRONOMY

The volume contained a 31 x 40 cm. “map of New-England, being the first that ever was here cut, and done by the best pattern that could be had, which being in some places defective, it made the other less exact: Yet doth it sufficiently show the situation of the country & conveniently well the distances of places.” The map was prepared by John Foster (1648-1681) and was oriented with north to the right, with relief pictorially depicted. “The figures that are joyned with the names of places are to distinguish such as have been assaulted by Indians from others.”



This map would be reissued in 1846 in Boston in conjunction with another early map, made in 1634 by William Wood, as a lithograph by William B. Fowle. These were the 1st maps to show both the Algonquian name “Musketaquid” and the English name “[Concord](#),” for the 1st inland settlement. Copies of the original maps are at the Boston Public Library and at the Boston Athenaeum.



1678

Crown glass was first produced, in London (because of its finer quality, this process would predominate until the middle of the 19th Century).

GLASS WINDOWS

Christiaan Huygens of the Netherlands, in a communication to the Academie des Science in Paris, presented the wave theory of light which he would propound in 1690 in his *TRAITE DE LUMIERE*, to wit, that light is transmitted through an all-pervading aether made up of small elastic particles, each of which can act as a secondary source of wavelets. On this basis Huygens was able to explain many of the known propagation characteristics of light, such as the double refraction in calcite that had been discovered in 1669 by Erasmus Bartholinus of Denmark.

1679

Robert Hooke persuaded [Isaac Newton](#) to “resume his former thoughts concerning the Moon.” Newton’s eventual publication of the result of this, in *PRINCIPIA MATHEMATICA*, would lead to an indignant protest from Hooke that although he had provided “the first hint of this invention,” Newton had granted him no recognition. Newton’s irritation led to his withholding his *OPTICKS* from publication until after Hooke’s death.

The 1st issue of “Connaissance de Temps” by Abbé Jean Picard, the oldest of the national ephemerides, appeared in this year.

CALENDAR
CARTOGRAPHY

In this year, also, a remarkable engraved portrait of the [moon](#) was made, by Giovanni Domenico:



ASTRONOMY

1680

The first [comet](#) ever to be discovered by use of a [telescope](#). It was discovered by Gottfried Kirch during the wee smalls of November 14th, before it reached its perihelion. It would be a sungrazer, although not necessarily a Kreutz sungrazer, passing closer to the sun on December 18th than the earth is to its moon. While observing this comet later with the Harvard College “3 foote and a halfe with a concave ey-glasse” reflecting telescope, Thomas Brattle would note that it was moving in an ellipse rather than in a circle. (Sir Isaac Newton would write up this up as part of *PRINCIPIA MATHEMATICA*.)

A hen alleged to be under the influence of the great [comet](#) of this year laid a “comet egg,” which is to say, an egg with a representation of the comet upon its shell.

During this year the Reverend Increase Mather preached on “Heaven’s Alarm to the World,... wherein is shown that fearful sights and signs in the heavens are the presages of great calamities at hand.” His text was from the book of Revelation: “And the third angel sounded, and there fell a great star from heaven, burning, as it were

a lamp,” and “Behold, the third woe cometh quickly.” In this as in other of his sermons he endorsed the theological view of the origin and function of comets. According to this view humans were “fallen into the dregs of time” with the day of judgment approaching. He explained away the warning of Jeremiah —“Be not dismayed at signs in the heavens”— and instanced that comets had been forerunners of nearly every form of evil. Having done full justice to evils thus presaged in scriptural times, he began a similar display in modern history by citing how the sky had foretold the invasions of Goths, Huns, Saracens, and Turks, and warned against ridiculing this idea of comets by instancing that Vespasian had died soon after ridiculing a [comet](#). According to his theory you could deduce the purpose of a comet from its general shape and appearance of comets. He cited Tertullian’s view that they were “God’s sharp razors on mankind, whereby he doth poll, and his scythe whereby he doth shear down multitudes of sinful creatures.” In summation, he declared: “For the Lord hath fired his beacon in the heavens among the stars of God there; the fearful sight is not yet out of sight. The warning piece of heaven is going off. Now, then, if the Lord discharge his murdering pieces from on high, and men be found in their sins unfit for death, their blood shall be upon them.” Also: “Do we see the sword blazing over us? Let it put us upon crying to God, that the judgment be diverted and not return upon us again so speedily.... Doth God threaten our very heavens? O pray unto him, that he would not take away stars and send comets to succeed them.”

ASTRONOMY

“Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people’s doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness.”

— [Nathaniel Hawthorne](#), THE SCARLET LETTER



ASTRONOMY

ASTRONOMY

Construction of the building which would become the oldest standing structure in Boston, known as the Old Cocked Hat, and which would not be demolished until 1860:



November 14: The 1st [comet](#) ever to be discovered by use of a [telescope](#) was noticed by Gottfried Kirch during the wee smalls before this dawn. The incoming object had not yet reached its perihelion. It would be a sungrazer, although not necessarily a Kreutz sungrazer, passing closer to the [sun](#) on December 18th than Earth is to its [moon](#).

SKY EVENT

Appearing over the northern colonies of America, this apparition would inspire the Reverend Increase Mather to preach a sermon on “Heaven’s Alarm to the World,” and caused the Dutch along the Hudson River to petition for a day of fasting and humiliation.

ASTRONOMY

ASTRONOMY

December 2: It would be generally reported that on this day a “virginal hen” had laid an egg which had an image on its shell of the great [comet](#) in the skies. The appearance of this cosmic egg would be depicted in careful woodcuts.

SKY EVENT

[John Evelyn](#)'s diary entry for this day was in part as follows:



I was curious to see & heare the famous Triale of my L[ord] Stafford [second] sonn to my Lord Thomas Howard, Earle of Arundel & Surry, Earle Marishall of England, & Grandfather to the present Duke of Norfolck, whom I so well knew, & from which excellent person, I received so many favours:

The Trial was in Westminster Hall, before the King, Lords & Commons, just in the same manner as just 40 yeares past, the greate & wise Earle of Strafford (there being but one letter differing their names) received his Tryal (for pretended ill government in Ireland) in that famous Parliament [and same place]: This Lord Staffords Father being High-Steward &c: Onely the Place of sitting was now exalted some considerable height from the Paved flore of the Hall, with a stage of boards, His Majesties Throne or state, the Woolsacks for the Judges, long formes for the Peeres, Chaire of the Lord Steward pro tempore, exactly ranged as in the House of Lords: All the sides on both hands Scaffolded to the very roofo, for the Members of the H: of Commons: At the upper end, & right side of the Kings state, was a box for his Majestie, others for the Greate Ladys on the left hand; and over head a gallerie for Ambassadors & Pub: Ministers: At the lower-end or Enterance was a Barr, & place for the Prisoner, The Lieutennant of the Toure of London, the Axe-bearer & Guards, My Lord Staffords two Daughters, the Marchionesse of Winchester being one. There was likewise a Box for my Lord to retire into: At the right hand in another box some what higher, stood the Witnesses, at the left, the Manegers, who were to produce & manege the Evidence & whole processe in the name of the Commons of England: viz: Serjeant Maynard, (the greate lawyer, the same who prosecuted the Cause against the Earle of Strafford 40 years before in the same place, being now neere 80 yeares of age) Sir William Jones, (late Attourney Gen:) Sir Fran: Winnington (a famous Pleader) & Mr. Treby (now Recorder of Lond[on]) not appearing in their gownes as Lawyers, but in their cloakes & swords, as representing the Commons of England. To these



ASTRONOMY

ASTRONOMY

*were joyn'd Mr. Hamden, Mr. Sechevarell, Mr. Poule, Coll[onel] Titus, Sir Tho[mas] Lee all Gentlemen of Qualitie & noted Parliament men:
The first two dayes (in which was read, the Commission, & Impeachment) was but a very tedious enterance into Matter of fact, the Charge, at which I was little present: But on Thursday being commodiously seated amongst the Commons, when the wittnesses were sworn, & deposed, of which the principle were Mr. Oates (who cal'd himselfe Doctor) Mr. Dugdale & Turberville: Oates tooke his Oath, that he delivered a Commission to V. Count Stafford from the Pope, to be Pay-Master Generall, to an Army intended to be raised &c: Dugdale, that being at my Lord Astons, the [Prisoner] dealt with him plainely to Murder his Majestie, & Turberville, that at Paris also he proposed the same to him &c.*

December 18: The great [comet](#) of this year was passing closer to the [sun](#), on this day, than Earth to its [moon](#).

SKY EVENT



ASTRONOMY

ASTRONOMY

1681

February 18: The tail of the great [comet](#) disappeared from general view. It has inspired a number of pamphlets. Most were terrified by it but it aided [Isaac Newton](#) in the study of parabolic orbits.

Memories of this “Great Comet of 1680” would add fuel to fantastical speculations by none less than [Edmond Halley](#) that the ancient Flood of Noah had been caused by the earth being drenched in the waters of a comet’s tail, and also would add fuel to a derivative speculation by a Reverend Whiston, that the earth itself had once



ASTRONOMY

ASTRONOMY

been a comet, set to rotating by being struck by another comet:



Even while Edmond Halley was hard at work on the study that would throw open the doors of comet science, Reverend William Whiston was elaborating and adding to an unpublished speculation by Halley that an ancient comet could have caused the Flood of Noah. Not Halley's Comet in its 1682 appearance but the great comet of 1680 was regarded, in this theory, as the possible return of the Noah comet. Now Whiston wrote *The Cause of the Flood Demonstrated* and his preposterous *A New Theory of the Earth*. In the latter, Whiston proposed the novel idea that Earth itself had once been a comet! (Another comet struck it and set it rotating.) Then in the time of Noah, the punishment of God came in the form of a disastrously close approach of the 1680 comet.

Whiston determined that the comet that caused the Flood came closest at noon, Peking time, on Monday, December 2, 2926 B.C. Unlike the earlier comet that had set the earth spinning, this one had plenty of coma and tail vapors to shroud Earth, and those vapors (claimed Whiston) condensed on our world to cover it with waters 6 miles deep. Whiston argued that the next comparable disaster would see the world destroyed by fire, and that the same comet -the Great Comet of 1680- would again be the divine instrument of destruction. The predicted date for this holocaust, the comet's next return, was 575 years later (an orbital period Whiston borrowed from Halley's incorrect reckoning). Thus the world would be destroyed by fire by this comet in the year 2255. Voltaire wrote that Whiston was "unreasonable enough to be astonished that people laughed at him." But many did not laugh, and there was panic in 1719 when some people supposed that Mars at a close, bright opposition was in fact the comet headed for Earth.

Comets were on everyone's mind and superstitions still prevailed. But as the seventeenth century ended, Edmond Halley was pondering a certain comet, and a paper and prediction of his were about to strike the world like a lightning bolt of sanity.

ASTRONOMY

March 19, Wednesday: [Isaac Newton](#), through his [telescope](#), caught a last glimpse of the great [comet](#) of 1680.

ASTRONOMY

1682

How many times does a “blazing exhalation” that has been appearing in the upper skies at intervals of about every 76 years at least since the year 1404 BCE have to return right on schedule, and lose another about 1/10,000ths of its mass into an awesome tail across the heavens, before anyone will notice that it is a recurring phenomenon? Well, maybe this time [Edmond Halley](#) would notice. And maybe, also, the Reverends Increase Mather and [Cotton Mather](#) would speculate on this bright [comet](#) through [Harvard College](#)’s “3 foote and a halfe with a concave ey-glasse” reflecting [telescope](#).

HARVARD OBSERVATORY
 HALLEY’S COMET
 ASTRONOMY

This is what Halley’s Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, [→](#) 1,057 BCE, [→](#) 466 BCE, [→](#) 391 BCE, [→](#) and 315 BCE, [→](#) but then on the 240 BCE [→](#) return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE [→](#) and again in 87 BCE, [→](#) and then it was recorded as being seen in 12 BCE, [→](#) 66 CE, [→](#) 141 CE, [→](#) 218 CE, [→](#) 295 CE, [→](#) 374 CE, [→](#) 451 CE, [→](#) 530 CE, [→](#) 607 CE, [→](#) 684 CE, [→](#) 760 CE (only by Chinese), [→](#) 837 CE, [→](#) 912 CE, [→](#) 989 CE, [→](#) 1066, [→](#) 1145, [→](#) 1222, [→](#) 1301, [→](#) 1378, [→](#) 1456, [→](#) 1531, [→](#) 1607, [→](#) 1682, [→](#) 1758, [→](#) 1835, [→](#) 1910, [→](#) and 1986 [→](#) - and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



HALLEY’S COMET



EDMOND HALLEY

August: The Reverend Increase Mather delivered another sermon on “The Latter Sign,” similar to the one he had delivered in 1680 on “Heaven’s Alarm to the World,” demonstrating that “the voice of God in signal providences, especially when repeated and iterated, ought to be hearkened unto.” Here the sky appearance of the [comet](#) came in for attention. Although his belief was that a comet amounted to a fire-ball flung from the hand of an avenging God at a guilty world, he evidently felt obliged to yield something to the scientific spirit; hence, in his DISCOURSE CONCERNING COMETS, which would see publication in the following year, he declared: “There are those who think that, inasmuch as comets may be supposed to proceed from natural causes, there is no speaking voice of Heaven in them beyond what is to be said of all other works of God. But certain it is that many things which may happen according to the course of Nature are portentous signs of Divine anger and prognostics of great evils hastening upon the world.” In regard to the eclipse of August, 1672, he added: “That year the college was eclipsed by the death of the learned president there, worthy Mr. Chauncey and two colonies –namely, Massachusetts and Plymouth– by the death of two governors, who died within a twelvemonth after.... Shall, then, such mighty works of God as comets are be insignificant things?”

[ASTRONOMY](#)



ASTRONOMY

ASTRONOMY

"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER

August 20 (Old Style): [John Evelyn](#)'s diary entry for this day indicates the presence of a [comet](#). Would it have been [Halley's Comet](#) that he was seeing, on its way in to whip around the sun on September 15th?

ASTRONOMY

... This night I saw another Comet neere Cancer, very bright, but the streame not so long:



October 2 (Old Style)5: *To Lond, din'd with the R[oyal] Society (now againe [meeting] after recesses). After dinner a French-man produced some experiments for the raising of Water: Also we found, that Water put in Vacuo Boyleano & the glasse hermetically sealed, if jogged & shaken, made the same noise as if so many pibble stones had ben in the glasse, or some solid body beaten against the bottom & sides of it: The reason; because the aire being exhausted both out of the water & the Vessel, the Contact of the water; was more immediate, & the body more solid; for it had ben easie to have broken the bottle with the water onely.*

October 27 (Old Style): *I suppd at the Earle of Clarendons, with my L[ord] Hide his bro, now the greate favorite, who now invited himselfe to dine at my house the tuesday following:*

August 26: A hen in Marburg laid an egg “with a starry design on its shell.”

“Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness.”

— [Nathaniel Hawthorne](#), THE SCARLET LETTER

August 29-September 1: Isaac Newton sketched the positions of [Halley's Comet](#) and its tail as it moved across Ursa Major.

ASTRONOMY

ASTRONOMY

September 15: [Halley's Comet](#) whipped around the [sun](#). On this visit it was being most carefully inspected by any number of astronomers, including [Edmond Halley](#). The detail of the [comet](#) was most carefully observed and sketched by Christiaan Huygens. Its tail was spanning as much as 30 degrees of the sky.

ASTRONOMY



1683

[Halley's Comet](#) was a publication opportunity. In this year appeared both Christopher Ness's *A STRANGE AND WONDERFUL TRINITY; OR, A TRIPPLICITY OF STUPENDOUS PRODIGES, CONSISTING OF A WONDERFUL ECLIPSE, AS WELL AS OF A WONDERFUL COMET, AND OF A WONDERFUL CONJUNCTION [of Jupiter, Saturn, and Mars], NOW IN ITS SECOND RETURN*, and the Reverend Increase Mather's *KOMETOGRAPHIA; OR, DISCOURSE CONCERNING COMETS*.... Attempting to provide a catalog of appearances of all known historical comets, the Reverend cited a number of appearances that we now know to have been Halley's Comet: he knew of the appearances during 66, 684, 837, 912, 1066, 1145, 1301, 1456, 1531, 1607, and 1682, missing the appearances it had made during 141, 218, 295, 347, 451, 530, 607, 760, 989, and 1378.

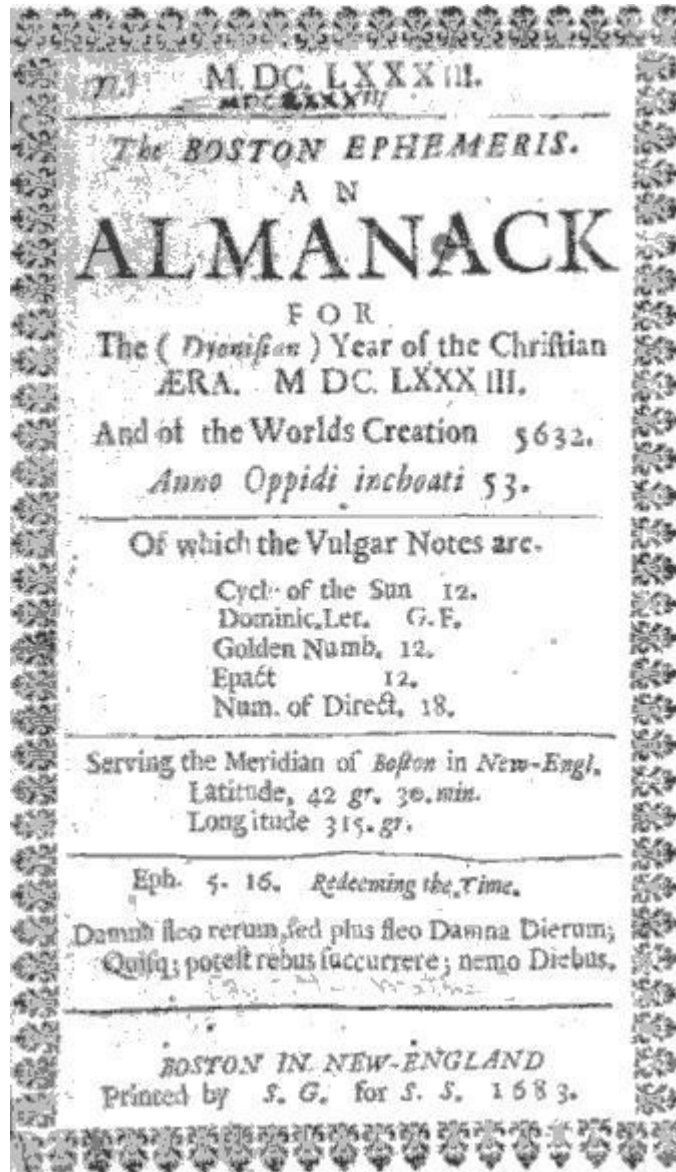


Of course, he supposed all these to be separate comets, rather than one comet returning multiple times. In this book the Reverend bound two of his sermons "occasioned by the late blasing [blasting] stars." The Reverend's son [Cotton Mather](#) authored an [almanac](#) article about this appearance of Halley's Comet.

SKY EVENT

ASTRONOMY

ASTRONOMY



1684

There was a major confrontation between Robert Hooke and [Isaac Newton](#) concerning the *PHILOSOPHIAE NATURALIS PRINCIPIA MATHEMATICA*, and the involvement Hooke had in its preparation. Although Newton claimed Hooke had no involvement, we now believe that Hooke was indeed involved. England's greatest scientific work was, however, published without any recognition being granted him.

As President of the Royal Society, [Samuel Pepys](#) placed his imprimatur on the title page.

Robert Hooke described a practical system of telegraphy. Also, during this year, he invented an odometer, an "otocousticon" aid to hearing, a reflecting quadrant, a wheel barometer, the anchor escapement of clocks, and the universal joint. Also during this year, he made suggestions as to the true principle of the arch, anticipated a method for showing nodal lines in vibrating surfaces, indicated the motion of the [sun](#) among the stars, and formed notions as to the nature of fossils and the succession of living things on Earth — notions that would later prove to be correct.

1686

Robert Hooke again confronted [Isaac Newton](#), this time in regard to the inverse square law of gravitation. On the basis of brushups like this, Newton would come to consider Hooke as his mortal enemy and would begin to do everything within his power to denigrate him. By studying Hooke's involvement in the early development of Newton's *PHILOSOPHIAE NATURALIS PRINCIPIA MATHEMATICA*, we can now belatedly assign to him some credit denied to him during his lifetime. Hooke's only known portrait and many of his inventions and papers have not survived the centuries. Perhaps a good portion of this historical neglect can be attributed to Newton's total disdain for Hooke, which was manifested in numerous and legendary attempts to obliterate Hooke from any association with the Royal Society and from any association with Newton's significant contributions to science.



ASTRONOMY

ASTRONOMY

August 12: The great [comet](#) of this year was first sighted, from the Cape of Good Hope, in the constellation of Lepus.

SKY EVENT

August 14 (August 4, Old Style): Henry Compton, Bishop of London, appeared before the High Commission pursuant to a summons sent him.

The great [comet](#) of this year appeared, from Brazil, to have an 18-degree tail. Its nucleus appeared to be just below the belt of Orion.

SKY EVENT

August 16: The great [comet](#) of this year was the closest, at this date, that it would get to Earth, at a distance of 0.32 astronomical units. Some Jesuit observers in Siam recorded the length of its tail at 15 degrees.

SKY EVENT

August 27: At this point the great [comet](#) of this year was at its brightest. From this point forward, its tail would be dwindling.

SKY EVENT

September 14: The great [comet](#) of this year appeared to be in the constellation of northern Hydra.

SKY EVENT

September 16 (September 6, Old Style): In England, the High Commission suspended Bishop Henry Compton.

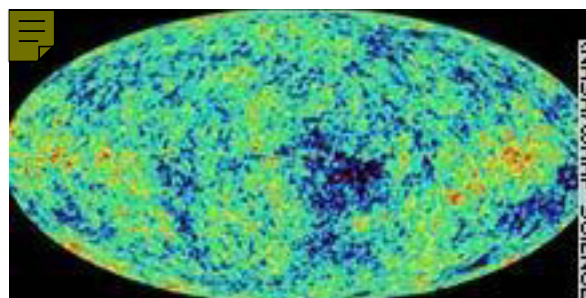
The great [comet](#) of this year went around the [sun](#) at a distance of 0.34 astronomical units, and headed back out into the universe at large.

SKY EVENT



"The Universe, as has been observed before, is an unsettlingly big place, a fact which for the sake of a quiet life most people tend to ignore. Many would happily move to somewhere smaller of their own devising, and this what most beings in fact do."

- Douglas Adams (from LIFE, THE UNIVERSE AND EVERYTHING, the 3rd book of the HITCHHIKER'S GUIDE TO THE GALAXY "trilogy in five parts")





ASTRONOMY

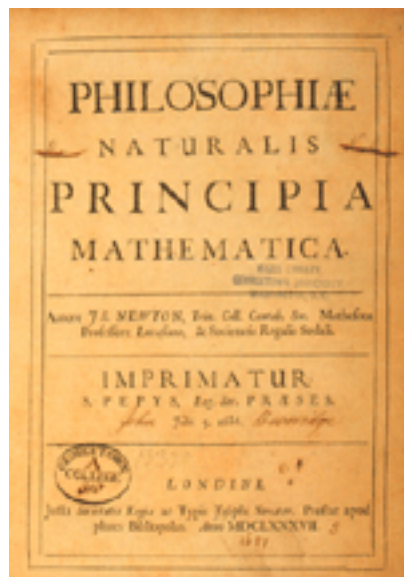
September 22: The great [comet](#) of this year was last glimpsed on this night.

ASTRONOMY

SKY EVENT

1687

[Edmond Halley](#) corrected the proofs of Sir [Isaac Newton](#)'s PRINCIPIA MATHEMATICA, which stated the law of universal gravitation that would make possible long-range [eclipse](#) prediction (he failed to catch one blunder).



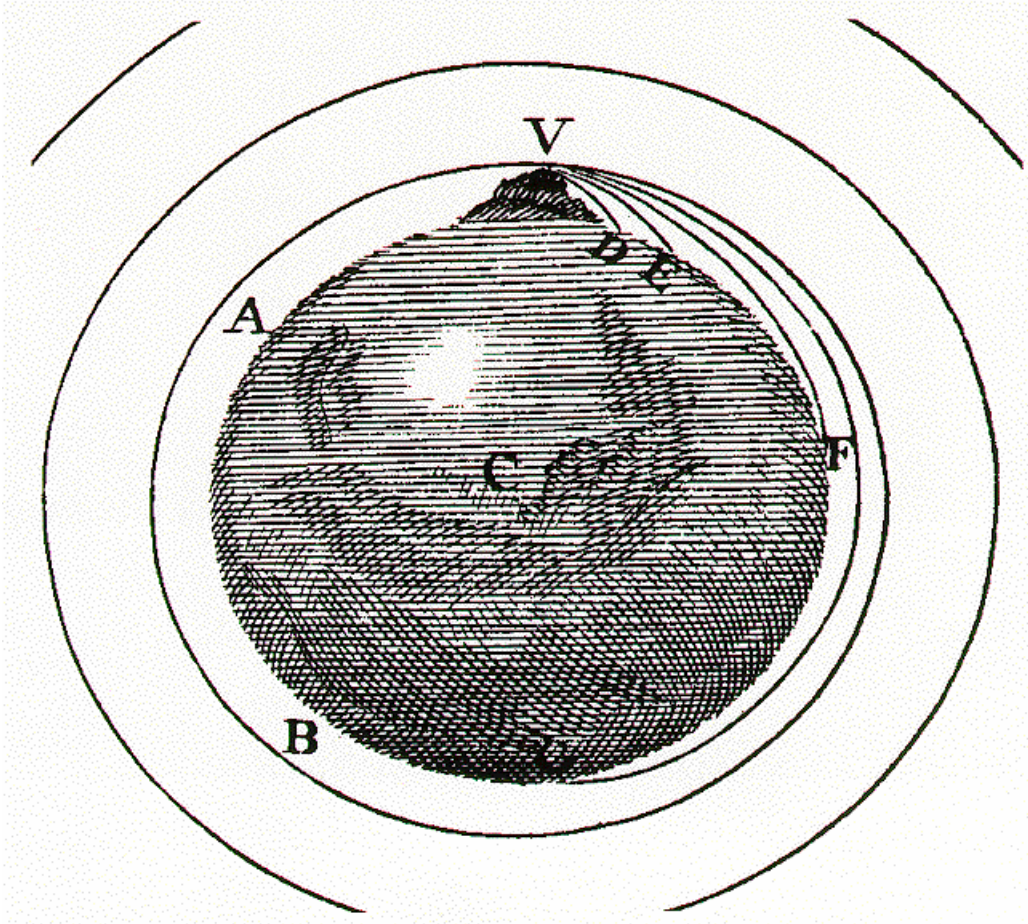
ASTRONOMY

(Newton's 1st Law of Motion already had been obvious to [Chinese](#) physicists of the 3rd Century — that's the 3rd Century **BCE**, by the way.)

ASTRONOMY

ASTRONOMY

July 6: Publication of [Sir Isaac Newton](#)'s *PRINCIPIA MATHEMATICA*. In this work he proposed a thought experiment which he illustrated in the following manner:



Suppose, suggested this author in Latin, there were to be a mountain on earth so high that air resistance were no longer of significance. Put a cannon on top of this mountain, and fire a cannonball using one bag of gunpowder. The cannonball would fall in the valley. Then fire a cannonball using two bags, and the cannonball falls in the next valley. Then use three bags, four bags, five bags, until the rate of fall of the cannonball was exactly equal to the curvature of this globe. At that point, always falling toward the earth, the cannonball would not strike the earth. It would continue around and destroy the cannon from which it had been fired. And so on and so forth, about the Moon.

This reminds us of a Latin epigram used twice by Thoreau in his journal, “*semper cadendo nunquam cadit*” (June 26, 1852, and one other early place) an epigram which has never been found anywhere else. I had a discussion with the curator of Harvard’s collection of historical scientific instruments, about the provenance of this “[by] always falling, [it] never falls” from Thoreau’s journal, pointing out that the most persistent research in such compendious sources as the TLG had failed to produce any such citation in any ancient author, and that inquiries into the sort of textbook of Latin grammar that had been used in the college preparatory academies of Thoreau’s period had failed to produce any such epigram. Her initial reaction was that it seemed very likely that this Thoreau epigram which we have been unable to provenance would be unlocatable because Thoreau had himself made it up. It would not be difficult for a person who knows Latin as well as Thoreau did, to devise such aphorisms out of whole cloth. Latin lends itself to such use, and in fact gentlemen of Thoreau’s period were forever coining epigrams of this sort in order to attach these mottoes to their families,



in our endless struggle to manufacture authentic family standing and privilege.

I would say that we can be assured that this epigram primarily refers to Newton's science, in particular to his explanation of all motion, both motion in a straight line and the motion of a moon in its elliptical orbit, in terms of a single set of mathematical formulas which we refer to as the Law of Gravity. The reason why we can be certain that it refers to Newtonian science is, that if it did not refer to Newton it would be an ignorant comment — and by and large Thoreau did not make ignorant comments. The reason why, in a post-Newtonian world, such a comment would be ignorant if it did not refer to the world-view and accomplishments of Sir Isaac Newton, is that Sir Isaac had lived and had done his work, which had been transformative. Back in the 17th Century, he had created an entire new world view. No remark, made afterward, would have been competent, had it neglected this fundamental transformation. Therefore after Newton, in our long 19th Century, when someone mentions "by always falling, it never falls," the primary referent could only be to Newton's explication of the motion of the moon in its orbit about the earth.

(It is curious that the Princeton editors of Thoreau's journal have failed to recognize this. It indicates that they are wearing the sort of blinders that is unfortunately all too typical of the humanities professor who has no background in science. As an example of this sort of humanities professor wearing blinders, I will offer Professor Louis P. Masur, who in his monograph 1831: YEAR OF ECLIPSE published by Hill and Wang in 2001 accepted that there had been, in the year 1831 in the USA, an eclipse of the sun. When I contacted Professor Masur by E-mail to point out to him that there had in fact in 1831 been no eclipse of the sun whatever, that had been significantly visible from any point in the United States of America, in response I received abusive E-mail messages from several of his students. As it turned out, neither Professor Masur nor his students had glanced at standard astronomical tables before coming to the conclusion on the basis of contemporary newspaper reports, that there had been an eclipse of the sun in 1831. The reason why they had not bothered to confirm their newspaper accounts of a solar event with the standard astronomical tables of eclipses, was that they were unaware of the existence of these tables, tables which are even present in full on the internet. Have you ever seen a draft horse, wearing blinders? The idiom "wearing blinders" is a very appropriate idiom to use in cases such as this Professor Masur, and in cases such as these Princeton editors of Thoreau's journal. They wear blinders that are all too typical of the humanities sorts who have no background in and no appreciation of science.)

(In 1702, David Gregory published five Latin pages by Newton in his *ASTRONOMIÆ PHYSICÆ & GEOMETRIÆ ELEMENTA*, and then an English translation of this appeared in 1715 as *THE ELEMENTS OF ASTRONOMY, PHYSICAL AND GEOMETRICAL. BY DAVID GREGORY ... DONE INTO ENGLISH, WITH ADDITIONS AND CORRECTIONS. TO WHICH IS ANNEX'D, DR. HALLEY'S SYNOPSIS OF THE ASTRONOMY OF COMETS. IN TWO VOLUMES.* It would be my working hypothesis therefore that this Latin motto "*semper cadendo nunquam cadit*" probably originated in some chapbook of the first quarter of the 18th Century, intended for the edification of students in the first principles of the new Newtonian mathematical natural philosophy. Research into this has, however, to date, not turned up a single factoid.)

1688

Two kinds of flat glass sheets had been being made. The more common kind, “crown” glass, was made by spinning a lump of molten glass until it spread out into a flattish plate. Even as late as 1800, most domestic [glass windows](#) would still display at their centers the characteristic umbilical imperfection, the “crown.” A higher quality had been achieved, however, by blowing a large bubble while pressing it against a metal plate until it approximated a cylinder, and then cutting this bubble open and flattening it out while the glass was hot and plastic. In about this year, in France, workers began to create mirror glass plates by a casting process created by Abraham Thevart. The cast glass needed to be hand polished. This new process would result in the founding of the St. Gobain glassworks. Distortion of image, due to imperfect mixing of the raw materials, would be characteristic of these early cast glass plates even after they had been rendered perfectly flat by polishing.

1687 The palace of Versailles, near Paris, finished by Louis XIV.

1688 The Revolution in Great Britain begins; November 5, King James abdicates; and retires to France, December 3.

1689 King William and Queen Mary, daughter and son-in-law to James, are proclaimed, February 16.

Viscount Dundee stands out for James in Scotland, but is killed by general Mackey, at the battle of Killycrankie; upon which the Highlanders, wearied with repeated misfortunes, disperse.

The land-tax passed in England.

The toleration act passed in ditto.

Several bishops are deprived for not taking the oath to king William.

William Fuller, who pretended to prove the prince of Wales spurious, was voted by the commons to be a notorious cheat, impostor, and false accuser.

1690 The battle of the Boyne gained by William against James in Ireland.

1691 The war in Ireland finished by the surrender of Limerick to William.

1692 The English and Dutch fleets, commanded by admiral Russel, defeat the French fleet off La Hogue.

1693 Bayonets at the end of loaded muskets first used by the French against the Confederates in the battle of Turin.

The duchy of Hanover made the ninth electorate.

Bank of England established by king William.

The first public lottery was drawn this year.

Massacre of Highlanders at Glenco, by king William's troops.

1694 Queen Mary dies at the age of 33, and William reigns alone.

Stamp duties instituted in England.

1696 The peace of Ryswick.

1699 The Scots settled a colony at the isthmus of Darien, in America, and called it Caledonia.

1700 Charles XII. of Sweden begins his reign.



ASTRONOMY

ASTRONOMY

1689

During this year there was a [comet](#) which possibly was a Kreutz sungrazer. It had a strongly curved tail that stretched for 68 degrees across the sky, but was visible only from the southern hemisphere, where there's not so much land and not so many observers.

ASTRONOMY

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ASTRONOMY





ASTRONOMY

ASTRONOMY

1691

Plates of glass of unprecedented size were at this point being produced by pouring molten glass onto a metal table, spreading it evenly with rollers, annealing, grinding, and polishing. Distortion of the image due to imperfect mixing of the raw materials is often seen in such early plate glass even when perfectly flat.

GLASS WINDOWS



1694

Fall: Drawing from theology and astrology, German prophet Johann Jacob Zimmerman had determined that the world would end in the autumn of 1694. He had gathered a group of 42 cultivated men who had agreed to become pilgrims and had made plans to go to the New World, where they would welcome Jesus back to Earth. However, he had died in February of this year on the very day of the group's departure. Johannes Kelpius, from a prominent family at Sieburgen in Transylvania, who had been a student of Dr. John Fabritius at Helmstadt, then took over leadership of this cult, "The Society of the Woman in the Wilderness," and with his leadership they had completed their journey to America. Needless to say, the cultists underwent profound disappointment in a New World that amounted more to a fresh beginning than to a final end (Daniel Cohen, *PROPHETS OF DOOM*, Brookfield CT: The Millbrook Press, 1999, pages 19-20). Among this group were three adherents of a peculiar Pietistic scheme of religion that had driven them from the universities of Germany, John Seelig, Barnard Kuster (or Coster), and Daniel Falkener, whose intention it was to consecrate themselves to a life of solitude. They would remain for awhile at Germantown, Pennsylvania and then settle in the wild, chiefly "on the Ridge" at nearby Roxborough. Johannes Kelpius would continue a correspondence with Maecken, in London, who was chaplain to the Prince of Denmark.

HERMITS

This is in fact a historic parallel to the "Heavens Gate" suicides in San Diego in 1997, for this group believed, as the group around Marshall Applewhite (Do) would believe centuries later, that the end of the world would coincide with the appearance of a comet, not of course the Hale-Bopp comet but one arriving in their year. However, the members of this group from the Palatinate did not commit suicide in order to "beam up" to their comet, and survivors of the disintegration of this group eventually would join others at Ephrata.

SKY EVENT

For the 1997 "Heavens Gate" mass suicide, consult the works of Robert W. Balch:

- 1976 (with David Taylor) "Salvation in a UFO." *Psychology Today* 10 (1976): 58-62, 66, 106.
- 1976 (with David Taylor) "Walking Out the Door of Your Life: Becoming a Member of a Contemporary UFO Cult. Missoula, MT: [by the authors], 1976. Paper presented at the annual meeting of the {Pacific Sociological Association}, San Diego CA
- 1977 (with David Taylor) "Seekers and Saucers: The Role of the Cultic Milieu in Joining a UFO Cult," *American Behavioral Scientist* 20:839-59.
- 1977 (with David Taylor) *Becoming a Sect: A Study of Social Change in a UFO Cult*. Missoula MO: [by the authors], 1977.
- 1977 (with David Taylor) "The Metamorphosis of a UFO Cult: A Study of Organizational Change." Missoula MT: [by the authors], 1977. Paper presented at the annual meeting of the Pacific Sociological Association, Sacramento CA
- 1978 (with David Taylor) "On Getting in Tune: Some Reflections on the Process of Making a Supernatural Contact. Missoula, MT: [by the authors]. Paper presented at the annual meeting of the Pacific Sociological Association, Spokane, Washington.
- 1979 *Two Models of Conversion and Commitment in a UFO Cult*. Missoula MT: [by the author], 1979. Paper presented at the annual meeting of the {Pacific Sociological Association}, Anaheim CA, 1979
- 1980 "Looking Behind the Scenes in a Religious Cult: Implications for the Study of Conversion." *Sociological Analysis* 41:137-143.
- 1981 *Bo and Peep: A Case Study of the Origins of Messianic Leadership*. Missoula MT: [by the author], 1981.



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- 1981 Conversion and Charisma in the Cultic Milieu: The Origins of a New Religion. Missoula MT: [by the author], 1981.
- 1982 "Bo and Peep: A Case Study of the Origins of Messianic Leadership." In MILLENNIALISM AND CHARISMA, edited by Roy Wallis. Belfast, Northern Ireland: The Queen's University Press.
- 1982 "When the Light Goes Out, The Darkness Comes: A Study of Defection from a Totalistic Cult." Missoula, MT: [by the author], 1982. Paper read at the 3rd International Conference on Religious Movements, May 6-9, 192, Orcas Island, Washington
- 1985 "When the Light Goes Out, The Darkness Comes." Pp. 11-63 in RELIGIOUS MOVEMENTS, edited by Rodney Stark. New York: Paragon House.
- 1995 "Waiting for the Ships: Disillusionment and the Revitalization of Faith in Bo and Peep's UFO Cult." In THE GODS HAVE LANDED: NEW RELIGIONS FROM OTHER WORLDS. Ed. James R. Lewis. Albany: State University of New York Press, 1995.

MILLENNIALISM

December: A [meteor](#) appeared in the skies over Salem. It broke into seven pieces, and overall the phenomenon was visible for three minutes.

"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER



1695

During this year there was a [comet](#) which may have been a Kreutz sungrazer. It had a 40-degree tail.

ASTRONOMY

1697

Leibnitz's *NOVISSIMA SINICA*. Picking up on the binary math that lay behind the 64 hexagrams of the *I CHING*, G.W. von Leibnitz hoped that [China](#) might become a key player in the internationalization of the scientific fraternity.

1698

February 16: Pierre Bouguer, who would become the founder of photometry, was born.

I don't know whether this is an Old Style date or a New Style date, but just on the assumption that it is a New Style date corresponding to February 6 Old Style, here is the diary entry of [John Evelyn](#) for February 6 (Old Style):

*I missed being at Church by my owne fault having over tired my selfe the night before about dispatching letters, as also I was the Sondag next:
The Czar Emp: of Moscovy, having a mind to see the Building of Ships, hired my house at Says Court, & made it his Court & palace, lying & remaining in it, new furnish'd for him by the King:*



1699

During this year the [comet](#) Tempel-Tuttle returned for a second visit.

1700

[Edmond Halley](#) described Robert Hooke's final invention, a marine telescope, to the Royal Society.




HISTORY OF OPTICS

1702

A [comet](#) appeared, that was mostly visible in the southern hemisphere. It had a 43-degree tail and possibly was a Kreutz sungrazer. Then another, distinct, comet passed the earth at a distance of only 0.04 astronomical units.

ASTRONOMY

1704

[Edmond Halley](#) inferred that the bright [comets](#) of the years 1531,  1607,  and 1682  were reappearances of the same entity, and correctly predicted on this basis that this bright comet would return in 1758.

HALLEY'S COMET

ASTRONOMY



Lady Masham sent G.W. von Leibnitz a copy of her father's THE TRUE INTELLECTUAL SYSTEM OF THE UNIVERSE.



RALPH CUDWORTH

1705

From the preface to [George Berkeley](#)'s *ARITHMETICA ABSQUE ALGEBRA AUT EUCLIDE DEMONSTRATA*, this writing would appear to have been in existence at this point, though he would not have it published until 1707. The volume is dedicated to Mr. Palliser, son of the archbishop of Cashel, and is followed by a MATHEMATICAL MISCELLANY containing some observations and theorems inscribed to his pupil Mr. Samuel Molyneux.



ASTRONOMY

ASTRONOMY

[Edmond Halley](#) staked his professional reputation by publishing a prediction that the [comet](#) of 1682 would be back in 1758.



ASTRONOMY

In this year the Earl of Halifax requested that Isaac Newton be knighted in order to increase Newton's chances for election to Parliament in Halifax's interest. Halley, who was quite as deserving of knighthood as Newton, was not being sponsored by any noble and was not standing for election — so, England being England, it wouldn't ever occur to anyone to recommend him for knighthood (possessing a bachelor's degree from Oxford, he would in 1710 in his standing as the Savilian Professor of Geometry there on the recommendation of the Chancellor of the university, who was the Duke of Ormonde, be recognized with the honorary degree of Doctor of Civil Laws, and since he was not wealthy all the fees for this would in his circumstance be waived).

1710

G.W. von Leibnitz, a guy who was so smart that he had even God all figured out, came to understand a reassuring factoid about cosmology: if among all the possible worlds, none had been better than the rest, then God would never have bestirred Himself to create one. As distressed as we are about things as they are, nothing better is possible. Hold still, this will only hurt a little bit and it is for your own good. The clueless "have nots" just don't get it. The powers that be are ordained of God. What's good for General Motors is good for the country. Vote straight Republican.

In 1843, during Thoreau’s lifetime, regularities dating back to this year would be reported, in the occurrence of strange dark spots on the face of the sun:

SUNSPOTS

The Sunspot Cycle 1710-1804

MIN / MAX
1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804

1712

Harvard College obtained an 8-foot reflecting telescope.

ASTRONOMY
HARVARD OBSERVATORY

1713

In England, [John Harrison](#) developed his first [chronometer](#).⁴⁵



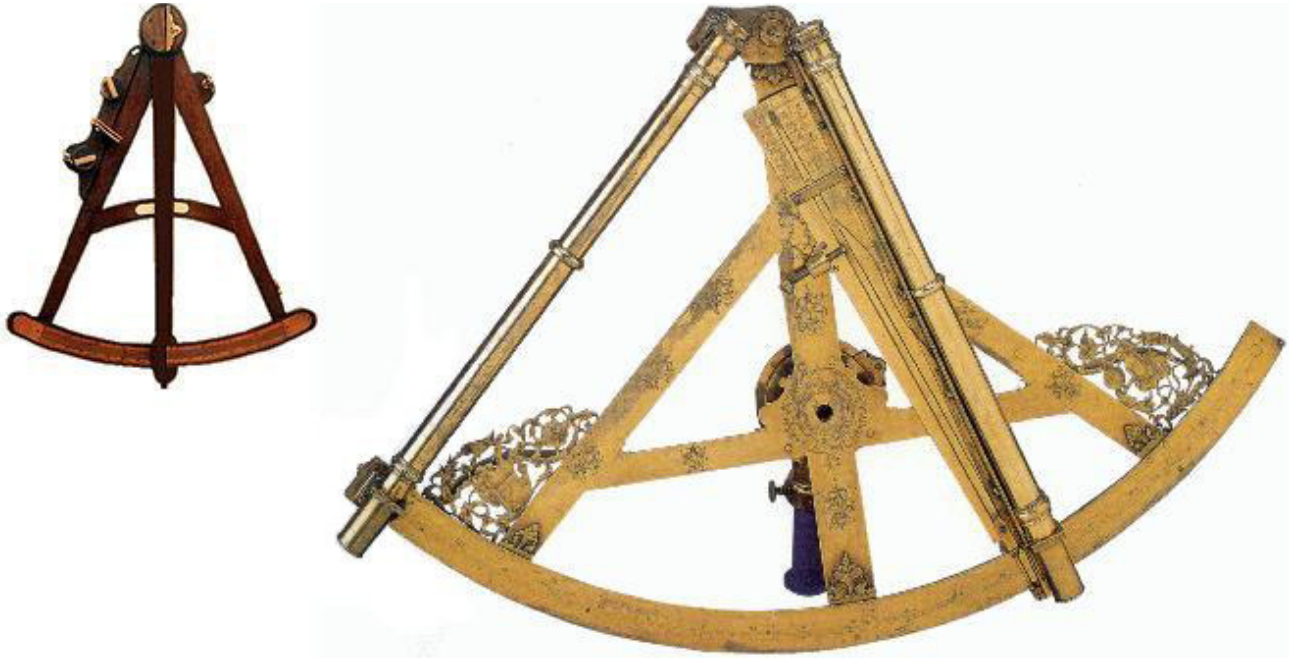
45. The techniques of mathematics, of the measurement of time, of the production of permanent photographic images, and of the manufacture of glass are equivalently vital in [Astronomy](#), as limiting items in the pace of its discoveries. Therefore, in considering the History of Astronomy, we need always to bear in mind the pace of the development of accurate clocks.

ASTRONOMY

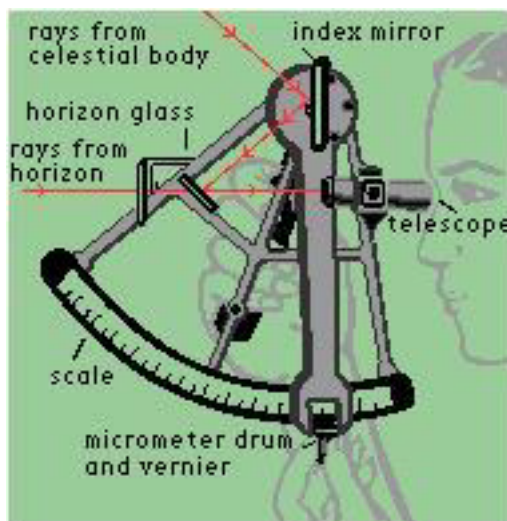
ASTRONOMY

1714

The [quadrant](#) was being improved into an [octant](#) instrument, on its way to becoming the modern [sextant](#).



for accurate determination of degrees of [latitude](#) or distance from the equator of the earth.



These instruments operated by aligning a star with the horizon of the earth, and could be made more accurate by such simple devices as the incorporation of a mirror. Longitude, or distance east or west from the Royal Observatory in Greenwich, England, could not be calculated with nearly so much accuracy, since it was necessary for a ship to carry an accurate [chronometer](#) set to local time at the Royal Observatory in Greenwich, England, and establish the time shown on the timepiece as the sun passed over their mast at high noon at their unknown location at sea. Errors were introduced by such things as the chronometers changing their rate during winding, and variations in temperature which altered the length of a pendulum. What a ship's captain would

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be forced to do was to sail to a safely blank point on his chart well to the east or west of his ship's destination and then, once on that line of [longitude](#), "run down" its destination at the correct latitude. Here is the problem known as "latitude sailing" as presented by W. Bourne in 1574 in his *A REGIMENT FOR THE SEA*:

Nowe some there be that be very inquisitiue to haue a way to get the longitude, but that is to tedious. For this they must consider, that the whole frame of the firmament is carried round from the east to the west in .24. hours, so as ther remaineth neither light nor marke, but goeth rounde, sauing only the .2. poles of the world, and theses .2. stand alwayes fast.

After this inefficient and dangerous technique of "latitude sailing" had caused Admiral Sir Clowdisley Shovel to lose four ships of a British fleet and almost 2,000 men while attempting to navigate the Scilly Isles, the government created a Board of Longitude funded to award a prize of £20,000 for a marine [chronometer](#) which would enable ships to establish their location to within 30 miles toward the end of a voyage from England to the West Indies. Unfortunately, this Board of Longitude came to be staffed by a group of astronomers and mathematicians who preferred astronomical solutions and rational solutions, and considered mechanical and practical solutions to be somehow *infra dig*.

1715

May 3: A total [eclipse](#) of the [sun](#) was visible from the town of London.

There had not been such a total eclipse of the sun visible from London since March 20, 1140.⁴⁶

It was during this eclipse that [Edmond Halley](#) observed the phenomenon that would become known as "Baily's Beads," a manifestation we now understand to be caused by the light of the occulted sun shining through the valleys between the mountains along the limb of the moon.

ASTRONOMY



46. By way of contrast, in accordance with the statistical law of probabilities there ought to be approximately one total solar eclipse visible in a given town for every four centuries. —But this law of probabilities cuts both ways, for in the Brisbane region of Australia, in 1856-1857, two total solar eclipses would occur less than a year apart!

1718

[Edmond Halley](#) noted that the supposedly fixed stars Sirius, Aldebaran, and Arcturus were no longer in the positions in which they had been observed in the 2d century of the Common Era by Ptolemy and Hipparchus. These supposedly fixed stars were actually **moving** in relation to the others!



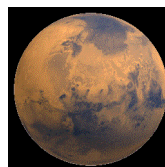
Go figure.

A tailless [comet](#) passed but 0.11 astronomical units away from Earth. It was moving at an apparent rate of nearly two degrees per hour, in the constellation of Ursa Minor.

ASTRONOMY

1719

With the planet [Mars](#) in opposition to the sun, and therefore at its brightest, many were taking it to be a red [comet](#) representing calamity. Observations at the Paris Observatory, however, were establishing on the basis of the appearance and disappearance of surface features that the planet's rotation period was approximately 24 hours, 40 minutes. They were able at this point to identify not only Syrtis Major but also a darkish swath from Mare Sirenum to Mare Tyrrhenum, and to verify that Mars, like Earth, had two noticeably whitish polar spots.



ASTRONOMY

April 5: According to a prediction that had been made by Jacques Bernoulli, progenitor of the mathematical Bernoulli family, the return of a [comet](#) on this day was going to destroy the planet Earth (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 240-241).

HERE COME DA JUDGE!

ASTRONOMY

ASTRONOMY

ASTRONOMY



"The nice thing about apocalyptic panics is that all you need for a feel-good moment is the earth not coming to an end."

— [Gail Collins, March 15, 2013](#).



December 19, night: The white people of [Boston](#) for the first time, a full century after the term "*aurora borealis*" had been coined, noticed that phenomenon in their sky. The report was circulated that a mysterious face had seemed to form in the atmosphere — many wondered whether this might be an indication of the [Last Judgment](#).

HERE COME DA JUDGE!

Of course it wasn't the Last Judgment and there wasn't a face in the sky, so I will illustrate this with a painting made in 1860 — we can pretend that the mammal in the foreground of Dennis Gale's painting is an earless Boston Harbor seal rather than a generic painter's seal:⁴⁷



AURORA BOREALIS



September 7, Sunday: ...I see the northern lights over my shoulder to remind me of the esquimaux, and that they are still my contemporaries on this globe, —that they too are taking their walks on another part of the planet— in pursuit of seals perchance....

47. How observant they were! —Or maybe it was backscatter of light from the town's newly installed gas street lamps?

1720

[John Harrison](#) developed his first pendulum [chronometer](#) which compensated for variations in temperature, and thus in length of pendulum, by means of a grid of alternate brass and iron rods.

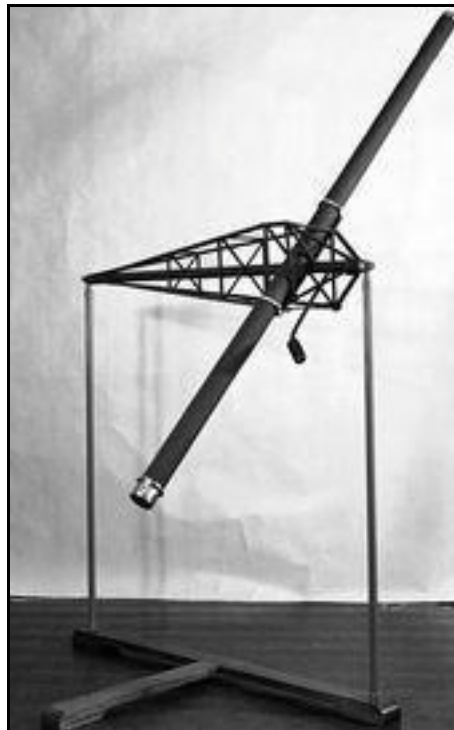


1721

At the age of 64, [Edmond Halley](#) succeeded Professor Flamsteed as England's astronomer royal.



Flamsteed's widow having removed all the instruments from the Greenwich Observatory, Robert Hooke and George Graham constructed a five foot transit instrument, the first transit instrument in England, for Halley's use. The new astronomer royal would make an extended series of observations of the moon and would measure but be unable to explain an observed acceleration in its mean motion.



ASTRONOMY

1722

[Harvard College](#) obtained a 24-foot refracting [telescope](#).

ASTRONOMY

HARVARD OBSERVATORY

1723

A [comet](#) passed by the earth at a distance of merely 0.1 astronomical units.

Thomas Robie observed a solar eclipse with [Harvard College](#)'s 24-foot refracting telescope:

SUNSPOTS

The Sunspot Cycle 1710-1804

MIN / MAX
1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804

ASTRONOMY

HARVARD OBSERVATORY

ASTRONOMY

ASTRONOMY

1724

May 22: A total solar [eclipse](#) was experienced in a broad swath across Ireland and England and Europe:



ASTRONOMY

William Stukele would report, of this total solar eclipse, that:

I chose for my station a place called Haradon hill, two miles eastward from Amesbury, and full east from the opening of Stonehenge avenue, to which it is as the point of view. Before me lay the vast plain where that celebrated work stands, and I



knew that the eclipse would appear directly over it: beside, I had the advantage of a very extensive prospect every way, this being the highest hill hereabouts, and nearest the middle of the shadow. Full west of me, and beyond Stonehenge, is a pretty copped hill, like the top of a cone lifting itself above the horizon: this is Clay hill, near Warminster, twenty miles distant, and near the central line of darkness, which must come from thence; so that I could have notice enough before-hand of its approach. Abraham Sturgis and Stephen Ewens, both of this place and sensible men, were with me. Though it was very cloudy, yet now and then we had gleams of sun-shine, rather more than I could perceive at any other place around us. These two persons looking through smoaked [*sic*] glasses, while I was taking some bearings of the country with a circumferentor, both confidently affirmed the eclipse was begun; when by my watch I found it just half an hour after five: and accordingly from thence the progress of it was visible, and very often to the naked eye; the thin clouds doing the office of glasses. From the time of the sun's body being half covered, there was a very conspicuous circular *iris* round the sun, with perfect colours. On all sides we beheld the shepherds hurrying their flocks into fold, the darkness coming on; for they expected nothing less than a total eclipse, for an hour and a quarter. When the sun looked very sharp, like a new moon, the sky was pretty clear in the spot: but soon after a thicker cloud covered it; at which time the *iris* vanished, the copped hill before mentioned grew very dark, together with the horizon on both sides, that is, to the north and south, and looked blue; just as it appears in the east at the declension of day: we had scarce time to tell then, when Salisbury steeple, six miles off southward, became very black; the copped hill quite lost, and a most gloomy night with full career came upon us. At this instant we lost sight of the sun, whose place among the clouds was hitherto sufficiently distinguishable, but now not the least trace of it to be found, no more than if really absent: then I saw by my watch, though with difficulty, and only by help of some light from the northern quarter, that it was six hours thirty-five minutes: just before this the whole compass of the heavens and earth looked of a lurid complexion, properly speaking, for it was black and blue; only on the earth upon the horizon the blue prevailed. There was likewise in the heavens among the clouds much green interspersed; so that the whole appearance was really very dreadful, and as symptoms of sickening nature. Now I perceived us involved in total darkness, and palpable, as I may aptly call it: though it came quick, yet I was so intent that I could perceive its steps, and feel it as it were drop upon us, and fall on the right shoulder (we looked westward) like a great dark mantle, or coverlet of a bed, thrown over us, or like the drawing of a curtain on that side: and the horses we held in our hands were very sensible of it, and crowded close to us, startling with great surprise. As much as I could see of the men's faces that stood by me, had a horrible aspect. At this instant I looked around me, not without exclamations of admiration, and could discern colours in the heavens; but the earth had lost its blue, and was wholly black. For some time, among the clouds, there were visible streaks of rays, tending



ASTRONOMY

ASTRONOMY

to the place of the sun as their centre; but immediately after, the whole appearance of the earth and sky was entirely black. Of all things I ever saw in my life, or can by imagination fancy, it was a sight the most tremendous.



ASTRONOMY

ASTRONOMY

1726

In GULLIVER'S TRAVELS, Jonathan Swift alluded to the prediction that had been made by [Edmond Halley](#), that the [comet](#) of 1682 would be returning in 1758.

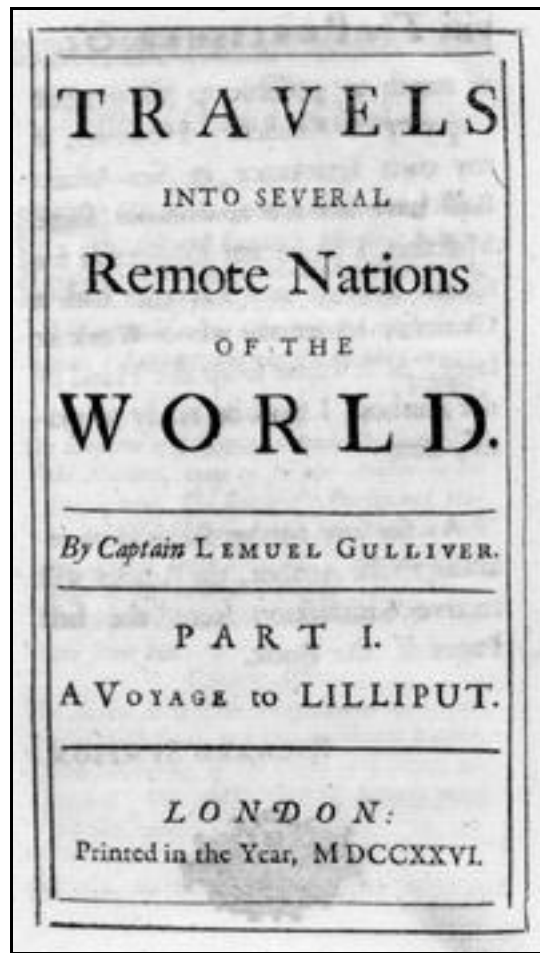
ASTRONOMY



"They [the astronomers of the flying island of Laputa] have observed ninety-three different comets and settled their periods with great exactness. If this be true (and they affirm it with great confidence), it is much to be wished that their observations were made public, whereby the theory of comets, which at present is very lame and defective, might be brought into perfection with other parts of astronomy."

— Jonathan Swift, GULLIVER'S TRAVELS, 1726







THE BIG-ENDIANS VERSUS THE LITTLE-ENDIANS

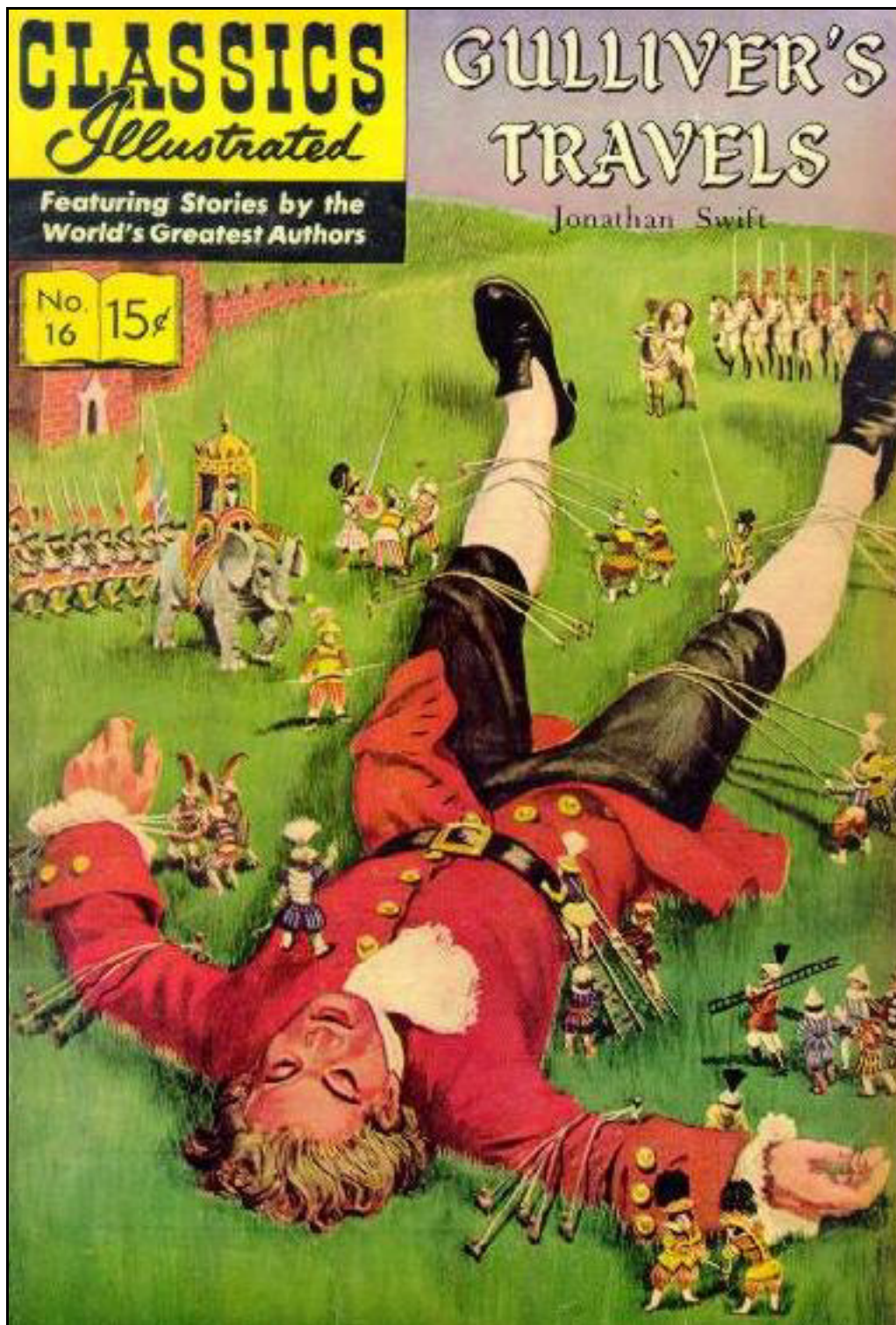
One Morning, about a Fortnight after I had obtained my Liberty, *Reldresal*, Principal Secretary (as they style him) of private Affairs, came to my House, attended only by one Servant. He ordered his Coach to wait at a distance, and desired I would give him an Hour's Audience; which I readily consented to, on account of his Quality, and Personal Merits, as well as the many good Offices he had done me during my Sollicitations at Court. I offered to lie down, that he might the more conveniently reach my Ear; but he chose rather to let me hold him in my hand during our Conversation. He began with Compliments on my Liberty; said he might pretend to some Merit in it: but, however, added, that if it had not been for the present Situation of things at Court, perhaps I might not have obtained it so soon. For, said he, as flourishing a Condition as we may appear to be in to Foreigners, we labor under two mighty Evils; a violent Faction at home, and the Danger of an Invasion by a most potent Enemy from abroad. As to the first, you are to understand, that for above seventy Moons past there have been two struggling Parties in this Empire, under the Names of *Tramecksan* and *Slamecksan*, from the high and low Heels on their shoes, by which they distinguish themselves. It is alleged indeed, that the high Heels are most agreeable to our ancient Constitution: But however this be, his Majesty has determined to make use of only low Heels in the Administration of the Government, and all Offices in the Gift of the Crown, as you cannot but observe; and particularly, that his Majesty's Imperial Heels are lower at least by a *Drurr* than any of his Court; (*Drurr* is a Measure about the fourteenth Part of an Inch). The Animositys between these two Parties run so high, that they will neither eat nor drink, nor talk with each other. We compute the *Tramecksan*, or High-Heels, to exceed us in number; but the Power is wholly on our Side. We apprehend his Imperial Highness, the Heir to the Crown, to have some Tendency towards the High-Heels; at least we can plainly discover one of his Heels higher than the other, which gives him a Hobble in his Gait. Now, in the midst of these intestine Disquiets, we are threatened with an Invasion from the Island of *Blefuscu*, which is the other great Empire of the Universe, almost as large and powerful as this of his Majesty. For as to what we have heard you affirm, that there are other Kingdoms and States in the World inhabited by human Creatures as large as yourself, our Philosophers are in much doubt, and would rather conjecture that you dropt from the Moon, or one of the Stars; because it is certain, that a hundred Mortals of your Bulk would, in a short time, destroy all the Fruits and Cattle of his Majesty's Dominions. Besides, our Histories of six thousand Moons make no mention of any other Regions, than the two great Empires of *Lilliput* and *Blefuscu*. Which two mighty Powers have, as I was going to tell you, been engaged in a most obstinate War for six and thirty Moons past. It began upon the following Occasion. It is allowed on all Hands, that the primitive way of breaking Eggs, before we eat them, was upon the larger End: But his present Majesty's Grand-father, while he was a Boy, going to eat an Egg,



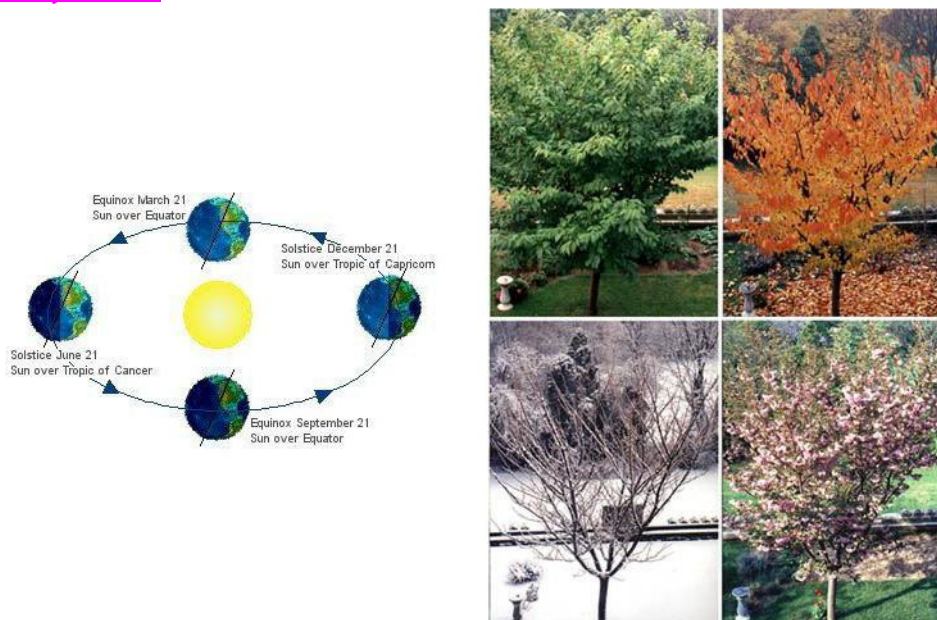
ASTRONOMY

ASTRONOMY

and breaking it according to the ancient Practice, happened to cut one of his Fingers. Whereupon the Emperor his Father published an Edict, commanding all his Subjects, upon great Penaltys, to break the smaller End of their Eggs. The People so highly resented this Law, that our Histories tell us there have been six Rebellions raised on that account; wherein one Emperor lost his Life, and another his Crown. These civil Commotions were constantly fomented by the Monarchs of *Blefuscu*; and when they were quelled, the Exiles always fled for Refuge to that Empire. It is computed, that eleven thousand Persons have, at several times, suffered Death, rather than submit to break their Eggs at the smaller End. Many hundred large Volumes have been published upon this Controversy: But the books of the *Big-Endians* have been long forbidden, and the whole Party rendered incapable by Law of holding Employments. During the Course of these Troubles, the Emperors of *Blefuscu* did frequently expostulate by their Ambassadors, accusing us of making a Schism in Religion, by offending against a fundamental Doctrine of our great Prophet *Lustrog*, in the fifty-fourth Chapter of the *Brundrecal* (which is their *Alcoran*.) This, however, is thought to be a meer Strain upon the Text: For the Words are these: *That all true Believers shall break their Eggs at the convenient End*: and which is the convenient End, seems, in my humble Opinion, to be left to every Man's Conscience, or at least in the power of the Chief Magistrate to determine. Now the *Big-Indian* Exiles have found so much Credit in the Emperor of *Blefuscu*'s Court, and so much private Assistance and Encouragement from their Party here at home, that a bloody War has been carried on between the two Empires for six and thirty Moons with various Success; during which time we have lost forty Capital Ships, and a much greater number of smaller Vessels, together with thirty thousand of our best Seamen and Soldiers; and the Damage received by the Enemy is reckon'd to be somewhat greater than Ours. However, they have now equipped a numerous Fleet, and are just preparing to make a Descent upon us; and his Imperial Majesty, placing great Confidence in your Valour and Strength, has commanded me to lay this Account of his affairs before you.



James Thompson began to issue his epic THE SEASONS, which would not be complete until 1740 and would cause a lawsuit which now stands at the basis of English copyright law and the concept of authorship. Lawrence Buell has said of this four-part blank verse cycle, on page 222 of THE ENVIRONMENTAL IMAGINATION, that its “ponderous pentameters” would be “[r]ead respectfully by a century of Anglo-American literary naturalists [*sic*] including Gilbert White, William Howitt and Mary Howitt, Susan Cooper and [Henry Thoreau](#).”



1727

The chemist Johann Heinrich Schulze showed by means of opaque stencils that, in a mixture of chalk and silver nitrate, light would darken the silver and produce a persisting shadow image. This was the barest beginning of “black and white” photography.⁴⁸

On the basis of careful measurement of the “aberration” in the positions of fixed stars, James Bradley of England was able to infer the approximate speed of light (these apparent motions of the fixed stars are known to be due to the motion of the earth in its orbit around the sun, and since we know very precisely the radius of the earth’s orbit and the length of the year, we can calculate the exact speed of the earth and on that basis we can calculate from the degrees and minutes and seconds of the apparent “aberration” of a fixed star approximately what the speed of light would have to be).

HISTORY OF OPTICS

48. The techniques of mathematics, of the measurement of time, of the production of permanent photographic images, and of the manufacture of glass are equivalently vital in [Astronomy](#), as limiting items in the pace of its discoveries. Therefore, in considering the History of Astronomy, we need always to bear in mind the pace of the development of photography.

MATHEMATICS

CHRONOMETRY

PHOTOGRAPHY

GLASSMAKING

In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

The Sunspot Cycle 1710-1804

Min / Max
1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804

March 20: Sir [Isaac Newton](#) died in London.

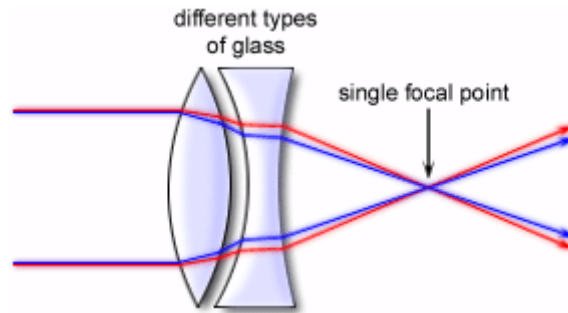
1728

[John Harrison](#) presented a pendulum [chronometer](#) to the British Board of [Longitude](#).



1729

Chester Moor Hall first came to understand the secret of the achromatic lens:



(But this new technique would not immediately become available.)

HISTORY OF OPTICS

An exceedingly bright [comet](#) remained visible to the naked eye for more than a month after it had passed around the sun. During the entire time that it was observable by telescope, some six months, it moved across but 15 degrees of the sky. The nucleus of this distant drifter may well have been well over an order of magnitude larger than your average comet that approaches closer to the sun.

SKY EVENT

1730

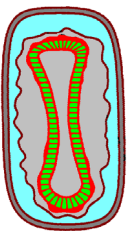
At [Newport, Rhode Island](#) was seen an [Aurora Borealis](#).

ASTRONOMY

After a death due to the [small pox](#), citizens exhibiting symptoms were quarantined on an island in Coasters Harbor.

A mob attempted to tear apart the local jail.

On Long Island the Reverend Henry Loveall, also known as “Desolate Baker,” was exposed and disgraced.

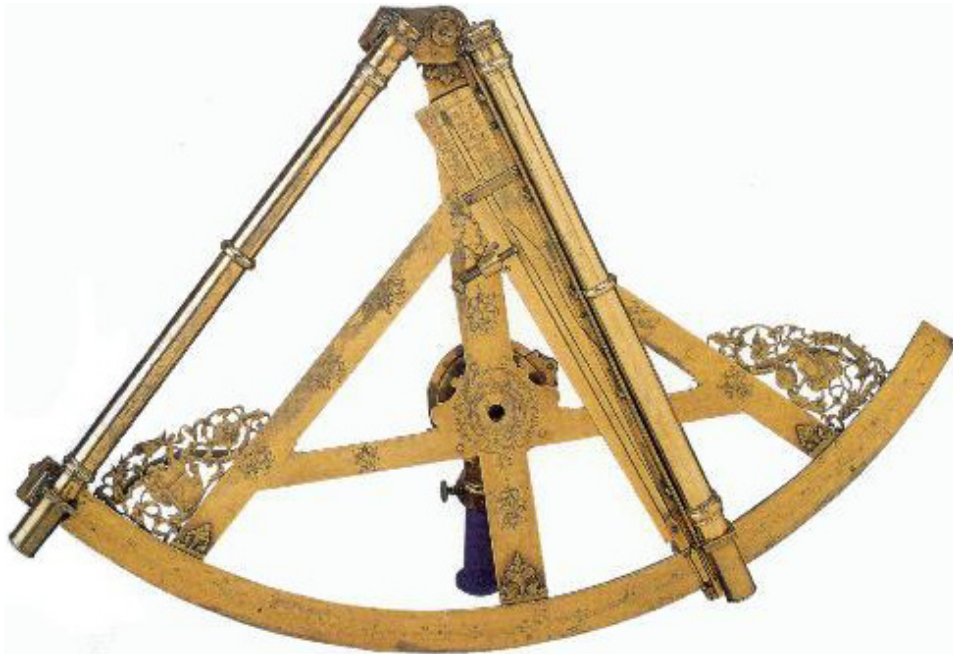


1731

A [comet](#) that appeared during this year was so bright that there are some reports that it was visible even during broad daylight. (But how could that be?)

SKY EVENT

John Hadley described his reflecting [quadrant](#) to the Royal Society.

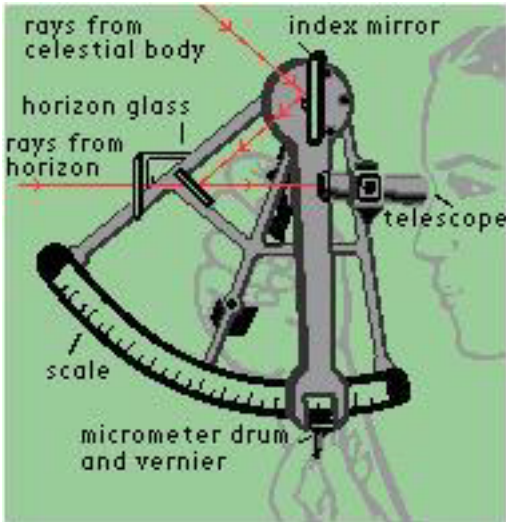


This Hadley quadrant with its added optics would be known as an [octant](#) because although its scale continues



to read to 90 degrees, the use of reflection doubles the angle and so the instrument itself forms only an eighth of a circle, or an octant, rather than a quarter of a circle, or quadrant. Hadley used mirrors to bring a reflected image of a star or the sun alongside the horizon when viewed through the sight, so that the instrument did not have to be held absolutely still on the pitching deck of a ship at sea to obtain an accurate reading.

In about the same period Thomas Godfrey in Philadelphia was making the same sort of development. Regardless of whether “John or Jonathan” deserves primary credit, these were important steps toward the eventual development of the nautical instrument known as the [sextant](#):



In conjunction with this instrument, of course, you would need to have aboard your vessel a booklet of calculated tables of declination, such as this one (on the following screen) by Joseph Moxon.

1732

In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

The Sunspot Cycle 1710-1804

☰

	MIN / MAX	☰
	1710 - 1718	
	1723 - 1727	
➡	1732 - 1739	
	1744 - 1750	
	1755 - 1762	
	1765 - 1770	
	1775 - 1779	
	1785 - 1788	
	1798 - 1804	

18
The USE of a
Mathematical INSTRUMENT,
Called a
QUADRANT.

Shewing very plainly, and easily to know, the exact Height and Distance of any Steeple, Tree, or House, &c. Also to know the Hour of the Day by it; the Height of the SUN, MOON, or STARS, and to know the time of the Sun-Rising, and Setting: and the Length of every Day in the Year: The Place of the Sun in the Ecliptick: The Azimuth, Right Ascension, and Declination of the Sun: With many other necessary and delightful Conclusions; perform'd very readily.

As also the Use of a *Nocturnal*, whereby you may learn to know the Stars in Heaven, and the Hour of the Night by them: With many other Delightful OPERATIONS.

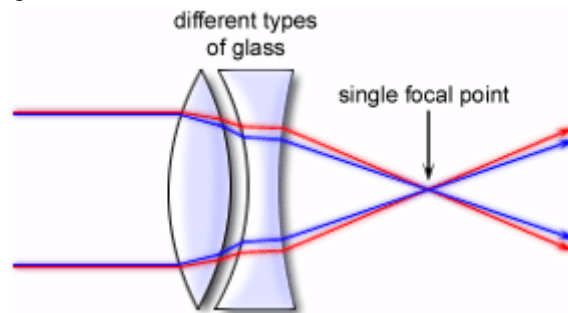
The Seventh Edition, wherein the Mistakes in the former Impressions are Corrected.

The Quadrants, Nocturnals, both large, and for the Pocket, and this Book, are to be Sold by F. Moxon, at the *Atlas*, in *Warwick-Lane*, London, 1708.

70:61:02

1733

Sir Isaac Newton had been able to cope with the chromatic distortion that had been for fully sixty years typical of the Galilean two-lens telescope by substituting a mirror for one of the two lenses, constructing what is known as the Newtonian or optical reflecting telescope. However, in this year, by stacking up and gluing together layers of glass with different refractive indices, Chester Moor Hall was able to fabricate a compound lens that had the valuable feature of being achromatic. Astronomers would again be able to make use of the optical reflecting telescope of Galileo.



1735

[John Harrison](#) presented to the British Board of [Longitude](#) the [chronometer](#) known as #1, now on display at the National Maritime Museum in London. The board authorized trials aboard HMS *Centurion*.



1737

[Leonhard Euler](#) urged the adoption of the Greek letter pi (π) to indicate the constancy of the ratio between the length of the diameter of any circle, and the length of its circumference.

In [China](#), a Jesuit priest, Father Ignatius Kegler, was witnessing what might have been an early return of the [comet](#) Swift-Tuttle — which would be officially discovered upon its return in 1862.⁴⁹

ASTRONOMY

May 7, Tuesday: At Philadelphia “was seen an [aurora borealis](#).”⁵⁰



ASTRONOMY

1739

Glass had for a long time been being manufactured in America and shipped to the Old World, because of the greater availability of fuel in the New World. However, at this point the 1st large-scale glasshouse in America, that would be successful and enduring, was being set up in New Jersey by the German-born manufacturer Caspar Wistar.

GLASS WINDOWS

49. The periodic comet Swift-Tuttle, not a small body at all, and with a potential impact speed of 60 kilometers per second, and with a generally intersecting trajectory, repeatedly whipping by us, has been described as the single most dangerous object known to humankind — somewhat more deadly even than your proverbial speeding bullet.

50. The citizens of Boston had observed such a phenomenon in 1719.

In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

The Sunspot Cycle 1710-1804

MIN / MAX
1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804

1742

January 14: [Edmond Halley](#) died.

1743

The English began to use the Italian word “influenza,” meaning “influence,” because they were hypothesizing that the illness in question might be an influence from the stars (in 1839 [Robert Southey](#) would coin the term “Flue” and in 1951 W.H. Auden would shorten this to “flu”).

October 21: [Benjamin Franklin](#) was setting up to observe an eclipse of the [moon](#) in Philadelphia when clouds began to stream in from the northeast, blotting out the night sky. Franklin’s brother in Boston, however, some 300 miles to the northeast, was able to observe the eclipse before these clouds streamed in from the northeast. What was this, a nor’easter that hits a city to the northeast four hours later than it hits a city to the southwest? How to account for such a counterintuitive phenomenon? Franklin hypothesized that what was actually happening was that the weather system was swirling counterclockwise, while traveling in a general northeasterly direction, thus giving the false impression to those along its eastern rim that it was coming from the northeast — when actually it was coming from the southwest.
Let’s give full credit where credit is due: this was a real toughie to figure out and Ben is the guy who figured it all out and he was exactly right.



ASTRONOMY

ASTRONOMY

November 29: A new [comet](#) was reported, in the constellation of Pisces.

SKY EVENT

December 8: At Philadelphia, “a [comet](#) visible for five or six nights.”⁵¹

SKY EVENT

1744

Mid-January: The [comet](#) that had appeared in the constellation of Pisces on November 29, 1743 had been getting brighter and brighter. It had passed into the constellation of Pegasus and its tail had grown to 15 degrees.

SKY EVENT

February 28, Friday: The [comet](#) that had been in the heavens since November had become so bright that it was visible in broad daylight even though it was diving toward the sun only 12 degrees away from the arc of the sun’s disk.

SKY EVENT

March 6-9: Philippe Loys de Cheseaux would report having been able to make out a distinctive fan of five to eleven tails more than 30 degrees in width on the bright [comet](#) in the skies, which had originated in the constellation of Pisces and had passed through the constellation of Pegasus and whipped around the sun at the start of the month and was at this point entering the constellation of Aquarius. Many of his fellow astronomers would not at the time credit this observation, although we now know this phenomenon as “synchrones” of a fan of dust tails, which can on occasion be glimpsed while they happen to become directly broadside to our observation.

SKY EVENT

March 18: The tail of the [comet](#) was at this point reaching halfway across our sky. It must have been at least 0.7 astronomical units in length!

SKY EVENT

April 22: The last glimpse of the [comet](#) of this year.

SKY EVENT

1747

A [comet](#) barely visible to the naked eye in this year was following a trajectory that now indicates to us that it has an enormous nucleus — this sighting may have been of one of the largest globs of ice and pebbles and dust that happen to be floating around out there that we have as yet had an opportunity to observe!

SKY EVENT

51. This [comet](#) passed Earth at 0.04 astronomical units in distance.

ASTRONOMY

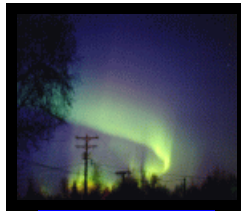
1748

April 21: At Philadelphia, “a [comet](#) visible for eight or ten nights past.”

SKY EVENT

1749

“17th of 12mo.”: In the skies over Philadelphia: “There was last evening an extraordinary appearance of the [aurora borealis](#), which moved from north-east to north-west, and back again.”



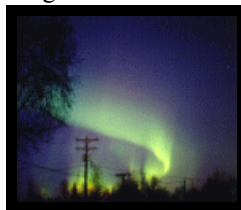
ASTRONOMY

1750

It was after this point that achromatic lenses became generally available to astronomers.

TELESCOPES

February 16, Monday: At Philadelphia, “a very bright [aurora borealis](#).”



1751

Despite growing deafness, [Lord Chesterfield](#), with the assistance of President of the Royal Society Lord Macclesfield and mathematician James Bradley, brought into being the new style of [calendar](#). In consequence this legislation is sometimes referred to as “Chesterfield’s Act.”

**1752**

Protestant England had until this year refused to accept Pope Gregory's 1582 corrections to the [calendar](#) — but during this year in accordance with the legislation known as “[Chesterfield's Act](#)” they omitted 11 days in order to bring themselves into synchronization with the rest of Europe. London property owners, hurt in the pocketbook by the fact that their tenants' leases were expiring 11 days early and their tenants were thus able to skip out of leased premises without paying 11 days rent that had been hoped for, staged protests. In Philadelphia, however, [Benjamin Franklin](#) calmly advised his readers to be grateful they could lie down in peace on the 2nd of the month of September and not wake up until the morning of the 14th.



January 1, New Year's Day: Since 1600, Scotland and much of Europe had been observing January 1st as its New Year's Day. At this point the stipulations of “[Chesterfield's Act](#)” brought England and her colonies into line with Scotland and Europe, as the Gregorian calendar replaced the Julian calendar:

“By act of Parliament, the year, which had begun on the 25th of March, was ordered to commence January 1st, 1752, and to have eleven days added to it, so as to make September 3d the 14th. Such an addition was made, that the Equinoxes and Solstices might be calculated to fall on their proper dates.”

March 25: There was nothing special about this day in the year 1752, for the year had officially begun already as of January 1st in the dead of the winter per the stipulations of “[Chesterfield's Act](#)” rather than waiting as usual for the spring season to inaugurate the new year. In this manner the English had abandoned a [calendar](#) system which had been gradually getting more and more out of whack with the solar system since the 12th Century, and brought themselves into line with observances in the rest of Europe.

September 3-13: Nothing happened. No time passed. One instant it had been midnight of September 2d, a Wednesday, or, maybe, midnight of September 12, a Wednesday, and the next instant per the stipulations of “[Chesterfield's Act](#)” it was September 13, a Thursday. Go figure. The British Isles had finally gone along with the rest of Europe dropping eleven days down the ol' Star-Trek timewarp and converting over to the Gregorian or “New Style” [calendar](#) from the Julian, or “Old Style,” calendar. They did not, for instance, adjust the festival days on which the Quarter Days fell, and thus, both in 1751 and in 1753, Lady Day was ostensibly celebrated on March 25th.⁵² Would this mean that workers would get paid by their employers for 11 days on which they had not worked? —Maybe, maybe not. And would they have to pay rent on their accommodations to their landlords for those 11 days that never were? —Maybe, maybe not. The English, never a people to let anybody get away with anything, began to distinguish between Lady Day and Old Lady Day better to keep track of who owed what to whom. (Thus it is that even as recently as TESS OF THE D'URBERVILLES, we are told of a “Lady Day” holiday that was followed shortly after by an “Old Lady Day” holiday — some of the English, obviously, were only reluctantly being dragged into the new calendar system.)⁵³



Although there have been many popular reports of “Give Us Back Our Eleven Days” riots, this is an urban legend. The populace had significant cause for concern, but this concern was based in no sense upon any time-

52. Quarter Days: In olden times the year was traditionally divided into four quarters, and one paid one's rents, one worked on one's temporary employment, etc., quarter by quarter more or less as a “temp” nowadays works hour by hour. The quarter days were March 25th, which was Lady Day, June 24th, which was Midsummers Day, September 29th, which was Michaelmas, and December 25th, which of course was Christmas Day. Lady Day was the celebration of the annunciation by the Angel Gabriel to the Virgin Mary.



superstition. This calendar “reform” was in fact prejudicial to the poor, the marginal, in that it had shortened the quarter-year without reducing the payment due from tenants paying rent by the quarter, while depriving these tenants of eleven days’ earning power that they sorely needed in order to create the liquidity to pay that quarter’s rent. The obvious inequity of this resulted in the UK commercial accounting periods which, since medieval times, had conventionally ended on Lady Day (March 25), Midsummer, Michaelmas, and [Christmas](#), being made to last an additional eleven days. In the UK today, Lady Day is the record of this very necessary adjustment, and is why the end of the fiscal/financial year in the UK continues to be April 5th each year, exactly eleven days after March 25th.

Approximately one American in five had emigrated from some country that had shifted in 1582 to the Gregorian calendar. For that reason we in the British colonies had been for some time utilizing both Julian and Gregorian calendars, a remarkable inconvenience. Refer to Robert Poole’s article on calendar reform in Britain (PAST AND PRESENT, 1996) for a dismissal of the urban legend that there were anti-Papist riots. For most people, in particular for merchants, the simplification and standardization was a welcome relief. Even in England there were no riots, and the urban legend that there were seems to stem from a misreading of a Hogarth engraving in which an election cudgelman is holding up a sign demanding “Give Us Back Our 11 Days.” Said Hogarth engraving was satiric.

53.CALENDAR REFORM:

Why do histories of events around 1582 for most of Europe, this year of 1752 for England and for British North America, and 1917 for Russia show pairs of conflicting dates? In 46BCE [Julius Caesar](#) instituted the Julian Calendar of 365 days to bring the Roman calendar back into adjustment, with a “leap year” every four years to take care of the quarter-day left over as, from a Ptolemaic perspective, the sun returned to its original coordinates in the sky. However, since a year actually is equal to 365.2422 days, this adjustment lacked sufficient precision. What was needed, but was not instituted until much later, was some further refinement of the Caesarian rule similar in effect to our present arrangement according to which every year whose number can be divided by four evenly is a leap year, **unless** it is exactly divisible by 100, and according to which those years which are divisible by 100 are not leap years **unless** they are exactly divisible by 400, when they become leap years again. (For similar reasons, societies such as China which operate according to a lunar calendar rather than a solar calendar every 19th year indulge themselves in **two** of the month of August, one following hard upon the other.) For lack of such precision tinkering, by 1582 enough of an error had been allowed to accumulate that the new year was arriving a full ten days too early, which led Pope Gregory XIII (*floruit* 1572CE-1585CE) to arbitrarily add ten days to the calendar. Such a reform by a Catholic pontiff did not play well in Protestant England, so it was not until 1752 that the English Parliament legislated an equivalent correction. This reform of the calendar as of 1752 made the conventional year more or less match the solar year, so that New Year’s Day was no longer to be celebrated on March 25th. (It was this calendar reform which made it unnecessary to use a double year notation such as “1751-52” for a date between January 1st and March 25th. In [Henry Thoreau](#)’s writings we see these old dates identified as “o.s.” standing for “Old Style.”)

1754

In Baltimore, [Maryland](#), the first clock constructed in the North American colonies, a wooden “striking” clock that would function appropriately and strike a bell upon the hour for some 50 years. The remarkable fact about this mechanism was that the person who had constructed it had not had the opportunity to inspect the mechanism of such a striking clock and was but 22 years of age. He was a young free black man with an 8th-grade education. What Benjamin Banneker had done was, he had borrowed a pocket watch from a well-to-do neighbor, taken it apart and made a drawing of each component, and reassembled and returned it fully functional, to its owner. Then from his drawings he had proceeded to carve out of wood enlarged replicas of each of these parts, calculating the proper number of teeth for each gear and the necessary relationships between the gears.



\$30 on the internet

(This seems to have been the 1st clock made wholly in America.)

1755

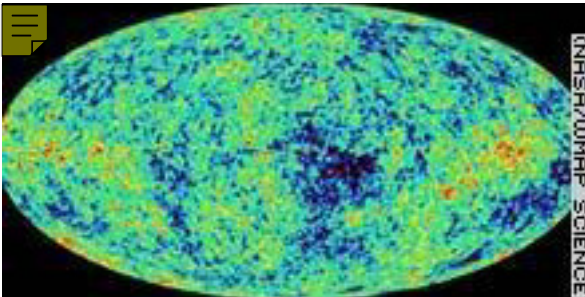
In this year in which he completed his university degree and became a *Privatdozent* (lecturer), [Immanuel Kant](#)'s mind was far, far away: he suggested that in other regions of the universe there were **other** clumps of stars similar to the Milky Way.

ASTRONOMY



“The Universe, as has been observed before, is an unsettlingly big place, a fact which for the sake of a quiet life most people tend to ignore. Many would happily move to somewhere smaller of their own devising, and this what most beings in fact do.”

- Douglas Adams (from LIFE, THE UNIVERSE AND EVERYTHING, the 3rd book of the HITCHHIKER’S GUIDE TO THE GALAXY “trilogy in five parts”)



In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

The Sunspot Cycle 1710-1804

	MIN / MAX	
	1710 - 1718	
	1723 - 1727	
	1732 - 1739	
	1744 - 1750	
➡	1755 - 1762	
	1765 - 1770	
	1775 - 1779	
	1785 - 1788	
	1798 - 1804	

ASTRONOMY

ASTRONOMY

November 1, All Saints Day: Three earthquake jolts estimated at magnitude 8.6-9.0 on the Richter scale, followed by three tsunami⁵⁴ and a fire, devastated the city of Lisbon in Portugal, the coast of the Iberian peninsula from Galicia to Andalusia, and the coast of Morocco. It seems likely that approximately 30,000 people, 11% of the population, were killed and over 90,000 buildings destroyed.

...Her story was as full of desperation and despair as her limited acquaintance with those uncomfortable emotions enabled her to make it, and having located it in Lisbon, she wound up with an earthquake, as a striking and appropriate *dénouement*. The manuscript was privately despatched, accompanied by a note, modestly saying that if the tale didn't get the prize, which the writer hardly dared expect, she would be very glad to receive any sum it might be considered worth.

Seventeen hundred and fifty-five.
Georgius Secundus was then alive, —
 Snuffy old drone from the German hive.
 That was the year when Lisbon-town
 Saw the earth open and gulp her down,
 And Braddock's army was done so brown,
 Left without a scalp to its crown.
 It was on that terrible Earthquake-day
 That the Deacon finished the one-horse shay.⁵⁵

The Reverend John Wesley (1730-1791) would soon be suggesting in his **SERIOUS THOUGHTS OCCASIONED BY THE LATE EARTHQUAKE AT LISBON** that if [Halley's Comet](#) did return as predicted, this time it might set the earth on fire.

SKY EVENT



54. These temblors had occurred along a plate boundary on the ocean floor, between the mid-Atlantic ridge and the Azores. For a comparison event within our own timeframe: <http://www.globalsecurity.org/military/world/indonesia/aceh-andaman-tsunami-imagery.htm>

55. From Oliver Wendell Holmes's "The Deacon's Masterpiece; or, The Wonderful 'One-Hoss Shay.' A Logical Story."

1756

January 2, Friday: At 4PM, at the country town of Tuam in Ireland, an exceedingly bright light suddenly occurred in the entire sky. This strange phenomenon faded by imperceptible gradations until, by 7PM, “[a sun of streamers](#)” could be observed as being stretched across the sky from west to east, and it was undulating like the waters of a rippling stream. These streamers gradually became discolored and then they flashed away toward the north. At the same time that the manifestation flashed away toward the north, all in the town experienced a sort of shock although this shock, whatever it was, seemed not to do any damage.⁵⁶

SKY EVENT



AURORA BOREALIS

An earthquake table lists the New England quake on this day as “1756JAN02 42.30 71.10 3 MA BOSTON.”

December 30: At Philadelphia, “people much surprised with the sight of two mock suns.”

SKY EVENT

1757

A natural philosopher (scientist) you may not have heard of, Jacques Gautier, predicted that [Edmond Halley](#) would be proven wrong. His [comet](#) would not be returning as predicted — for such apparitions were mere movements within our atmosphere — clearly they were mere local meteorological phenomena.

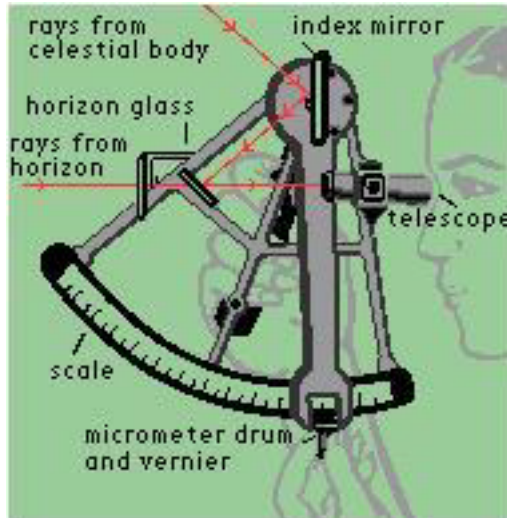
ASTRONOMY

⁵⁶. This has been said to have been an especially powerful episode of Northern Lights, but if it had been that, would it not have been reported also from the larger towns of Ireland such as Belfast, Dublin, or nearby Galway?

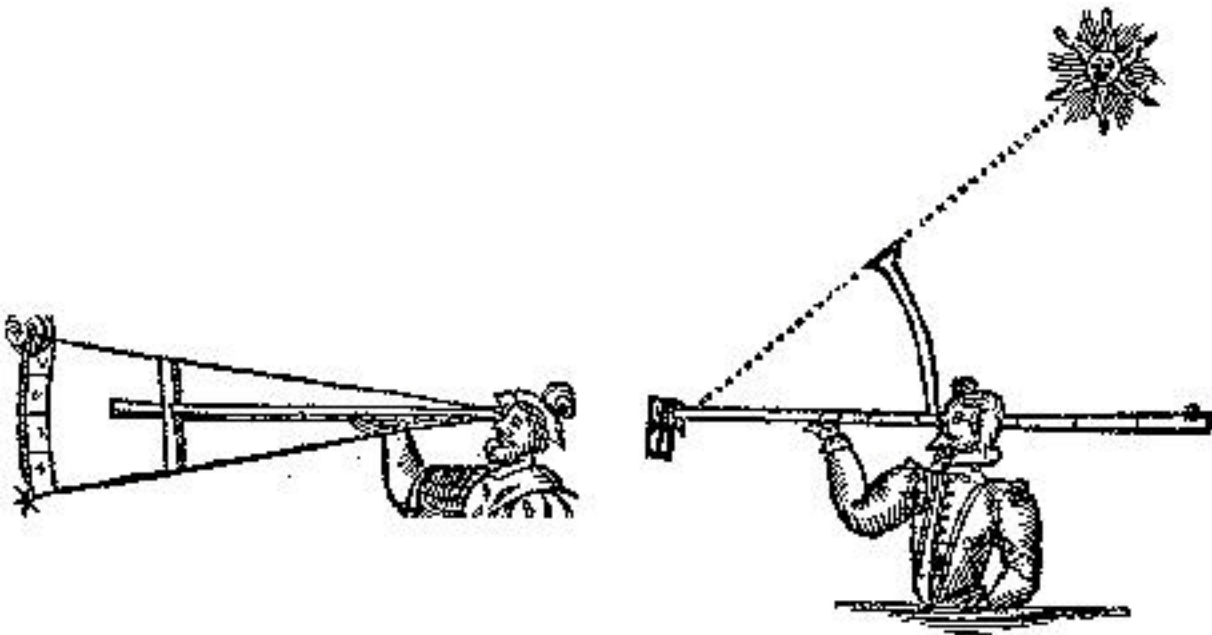
ASTRONOMY

ASTRONOMY

Astronomical [sextants](#) had been in use since the 16th century but in this year a sturdy version was developed to the specifications of Captain John Campbell by the London instrument maker John Bird in order to plot the [latitude](#) of a vessel at sea. The device followed the principle of the [octant](#) but could be used for angles up to 120 degrees.



Such instruments entirely replaced the [cross staff](#) and the [back staff](#).⁵⁷



1758

A bright [comet](#) was visible in the twilight, only a few degrees away from the disk of the sun (this one wasn't Halley's).

In this year Voltaire was mocking the astronomers as not daring to go to bed for fear they would miss the return of their precious [Halley's Comet](#).

ASTRONOMY

December 25, night: [Edmond Halley](#)'s prediction of 1704 → was confirmed, when the bright [comet](#) which had been observed in the years 1531, → 1607, → and 1682 → reappeared in the winter skies. The best calculations possible during this epoch had proved a month off — because they had been using incorrect estimates for the masses of Jupiter and Saturn. Thus it was an amateur, Johann Georg Palitzsch, who first spotted [Halley's Comet](#), returning as predicted.

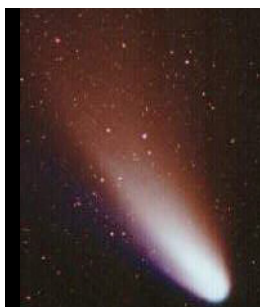
Unfortunately, Halley wasn't able to make an appearance at the party in his honor or collect on any bets he may have taken, as at this point he'd already been dead for some 16 years.⁵⁸

SKY EVENT

57. In the 16th century, the [cross staff](#) had been a European version of the *kamal* used by Arab navigators.



The *kamal* was a square table which had a string with knots threaded through it. Each knot represented a different port. The navigator would select the port he was trying to reach, and hold the knot in his teeth to tighten the string, while he held the table to his eye. Altitude was found when the horizon was at the lower edge of the table and the Pole Star at the upper edge. This device, and the cross staff, helped determine a ship's latitude by making solar observations. A European navigator would place one end of the staff against his eye and slide the horizontal stick along the staff until one end lined up with the horizon and the other end with the sun. A scale written along the staff provided the angle between the two. To use such a device, one was forced to squint into the sun for a period of time. The [back staff](#), which had been invented around 1595, allowed the European navigator to stand with his back toward the sun. While observing the horizon through a slit, he would slide the upright arm until the edge of its shadow met the slit. 58. Later, it would be added that P/Halley's was the same comet as had appeared in the heavens above the invading Norman French in 1066 CE and which they depicted in the Bayeux Tapestry, and its previous visits would be traced all the way back to 1404 BCE.



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY

September 12, night: Charles Messier noted a patch of light in Taurus, that would eventually become known as the "Crab Nebula." This would become the first object in the Messier Catalogue.

ASTRONOMY

1759

Nathan Davis of Acton, son of Samuel Davis, graduated at Harvard College. He would be ordained as the minister at Dracut on November 20, 1765, be dismissed there in 1785, remove to Boston, and be appointed as the chaplain at Fort Independence, and a review officer. He would die on March 4, 1803, at the age of 65.

Professor of Mathematics and Physics John Winthrop at Harvard published TWO LECTURES ON COMETS, which he had delivered to popular audiences in Boston, in which he correctly predicted that a comet seen in 1682, called "Halley's Comet," would return and again be seen.

ASTRONOMY

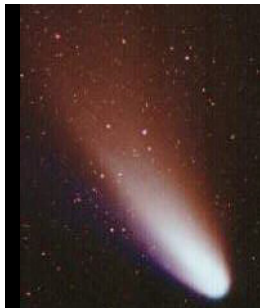
HARVARD OBSERVATORY

[John Harrison](#) completed work on his 4th marine [chronometer](#). This instrument was proven suitable for calculating [longitudes](#) at sea.



March 13: [Halley's Comet](#) whipped around the sun. It would come closer to the earth after its perihelion, at 0.1222 astronomical units, and would have seemed quite bright, except for the fact that this time it was passing under the earth and was visible mostly from the southern hemisphere where there weren't nearly so many observers.

ASTRONOMY



HALLEY'S COMET



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EDMOND HALLEY

ASTRONOMY

ASTRONOMY



March 31: [Halley's Comet](#) was observed by Messer, low in the morning twilight.⁵⁹

59. At one point during this year a non-periodic [comet](#) whizzed by the earth at only 0.07 astronomical units, traveling at the speed of a degree an hour. (Differentiate in your mind between this one and Halley's.)



ASTRONOMY

ASTRONOMY

April 1: [Halley's Comet](#) was again observed low in the morning twilight by Messer. It had a 25-degree tail. Since King Kamehameha I of Hawaii would be reputed to have been born on a night during which “a strange star with a tail of white fire” was appearing in the western heavens, he may well have been born at about this date: although there is no chance that this notorious periodic comet functioned as the “Star of Bethlehem” as of 12 BCE, as of 1759 CE it may well have functioned as the “Star of Aloha”!

ASTRONOMY

1761

Nevil Maskeline, 5th Astronomer Royal, tested the lunar distance method for [longitude](#) on a voyage to St. Helena where he observed the transit of Venus. He reported, in his BRITISH MARINER'S GUIDE, that “lunars” were suitable for determining longitude at sea.

CARTOGRAPHY

While observing the transit of Venus across the face of the sun –an event which was happening twice in this period within eight years but which would not then be scheduled to occur again for over a century– Mikhail Vasilyevich Lomonosov determined something of great interest: The planet Venus is such a thing in the sky as to have an **atmosphere**.

April 5: William Bell had been insisting that on this day Earth was going to be destroyed by earthquake. Since there had been an earthquake on February 8th and another on March 8th, he had felt it to be legitimate to infer that the world must end in another 28 days' time. Again Londoners gathered, and some headed for the hills. When his prediction didn't happen, he was taken into Bedlam, London's special place for people of this sort (Randi, James. THE MASK OF NOSTRADAMUS. Amherst NY: Prometheus Books, 1993, page 241).

MILLENNIALISM

April 6, day: Thomas Hancock, a prominent merchant of [Boston](#), offered a fine portable reflecting [telescope](#) to [Harvard College](#).⁶⁰

ASTRONOMY

HARVARD OBSERVATORY

60. However, before this instrument was delivered it was taken off for use in the expedition to Newfoundland for the observation of a transit of the planet Venus across the surface of the sun, the purpose of which was to more accurately determine the distance of the sun from the earth. This surviving instrument would never in fact be delivered to Harvard, for the American Revolution intervened. It apparently became part of the plunder of that war, and is presently to be seen at the Science Museum of South Kensington, England. Had it been delivered to Harvard rather than seized in this manner, of course, it would have been consumed with the other astronomical instruments in Harvard Hall in the great fire of January 24, 1764!

ASTRONOMY

ASTRONOMY

November: [John Harrison](#)'s [Chronometer](#) #4 was tested during a voyage of HMS *Depforth* to Jamaica. He had reduced the size of his device from 41 centimeters tall, and was able to fit it inside the silver case of the enormous personal watch then known as a "turnip."⁶¹



"The major British outposts in the Antilles -Barbados in the seventeenth century, Jamaica in the eighteenth- were always more valuable by far to the mother country than the mainland colonies that would one day declare their independence."

— Michael Zuckerman, *ALMOST CHOSEN PEOPLE: OBLIQUE BIOGRAPHIES IN THE AMERICAN GRAIN*, 1993, page 177



61. Putting one of those things into your pants was like fitting a 5 1/4" floppy into your shirt pocket: theoretically it was doable, but anyone who saw you trying to do it would consider you a fool.

1762

The result of the tests of [John Harrison](#)'s [Chronometer](#) #4 aboard HMS *Depforth* was accuracy to within five seconds, amounting to one and a quarter degrees of [longitude](#).



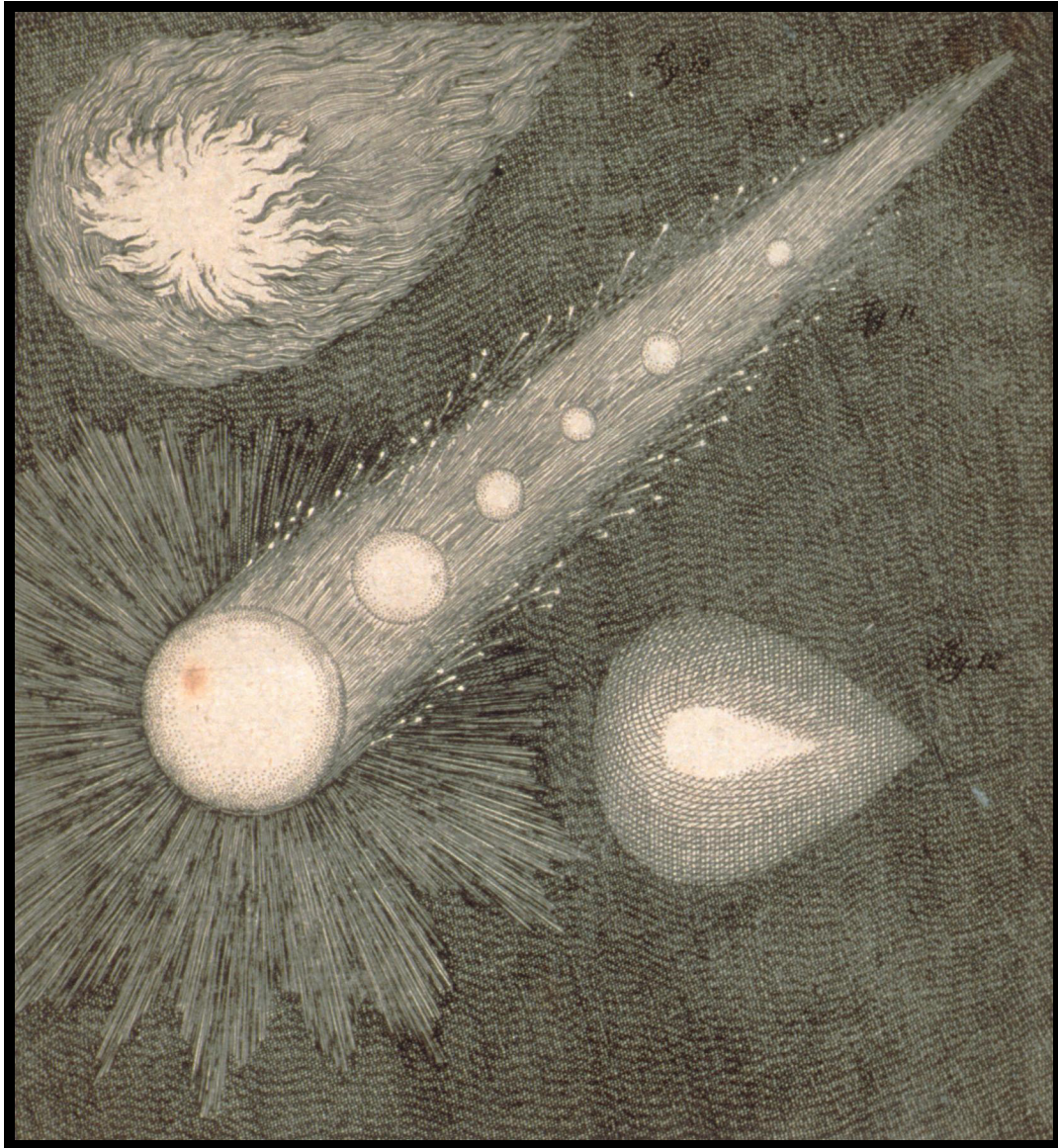
In 1843, during Thoreau's lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

The Sunspot Cycle 1710-1804

MIN / MAX	
1710 - 1718	
1723 - 1727	
1732 - 1739	
1744 - 1750	
1755 - 1762	←
1765 - 1770	
1775 - 1779	
1785 - 1788	
1798 - 1804	

July 23: There were fireballs over Germany:



"Nothing was more common, in those days, than to interpret all meteoric appearances, and other natural phenomena that occurred with less regularity than the rise and set of sun and moon, as so many revelations from a supernatural source. Thus, a blazing spear, a sword of flame, a bow, or a sheaf of arrows seen in the midnight sky, prefigured Indian warfare. Pestilence was known to have been foreboded by a shower of crimson light. We doubt whether any marked event, for good or evil, ever befell New England, from its settlement down to revolutionary times, of which the inhabitants had not been previously warned by some spectacle of its nature. Not seldom, it had been seen by multitudes. Oftener, however, its credibility rested on the faith of some lonely eye-witness, who beheld the wonder through the coloured, magnifying, and distorted medium of his imagination, and shaped it more distinctly in his after-thought. It was, indeed, a majestic idea that the destiny of nations should be revealed, in these awful hieroglyphics, on the cope of heaven. A scroll so wide might not be deemed too expensive for Providence to write a people's doom upon. The belief was a favourite one with our forefathers, as betokening that their infant commonwealth was under a celestial guardianship of peculiar intimacy and strictness."

— [Nathaniel Hawthorne](#), THE SCARLET LETTER



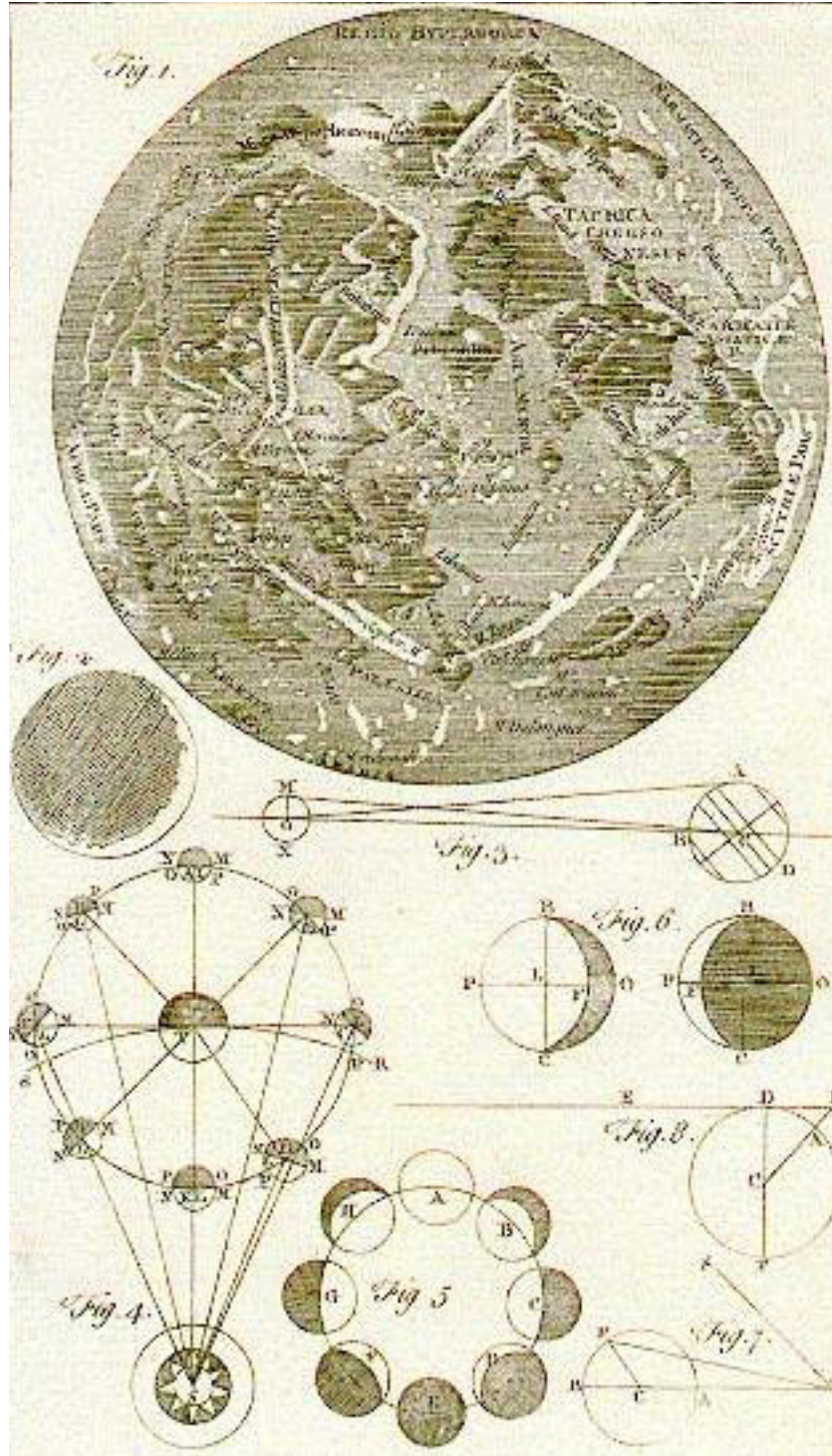
1763

[John Harrison](#) received a partial award for his marine [chronometer](#), because the Board of [Longitude](#), favoring an astronomical and rational solution over any mechanical or merely practical solution, was holding out for the kind of solution one could *understand*. And, in fact, except for Harrison's technique for keeping his clock running at the same rate while it was being wound, there has proved to be nothing in his ingenious kludge design which would prove to be useful in the development of new generations of chronometer in the 20th Century. The French government had created a board of longitude in about the same time period as the British, and the designs awarded the French prizes have turned out to be of considerably greater long-term usefulness.




A [comet](#) passed 0.09 astronomical units from Earth.

An image was made of the moon:



1764

 January 24, day: At night during a driving snowstorm, Harvard Hall burned. In the general conflagration (Hollis Hall was also “burnt much” and other surrounding buildings were badly scorched) all but one of [Harvard College](#)’s astronomical instruments were consumed.⁶² The entire library of the college was destroyed. The Reverend John Harvard’s library donation was lost except for one volume which had been removed from

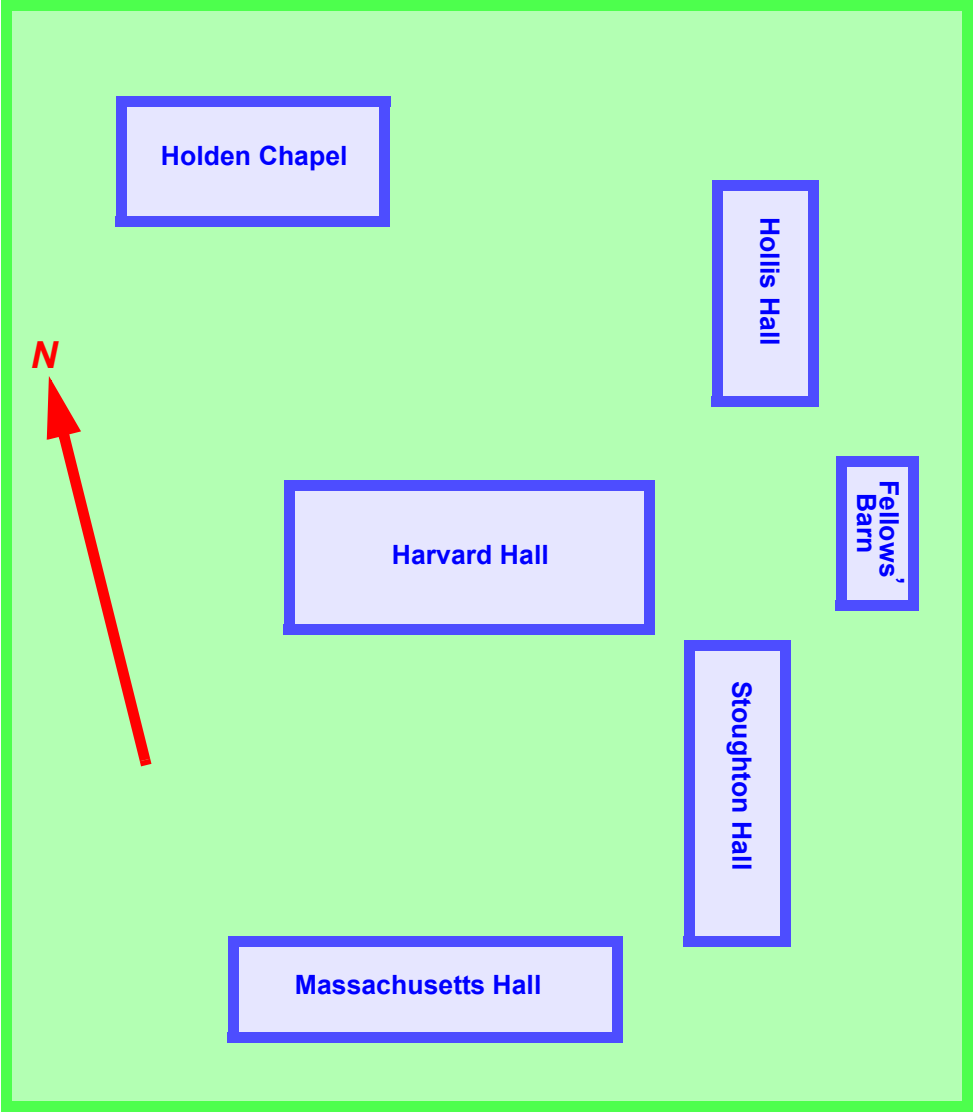
62. The instrument that escaped the fire was the Thomas Hancock portable reflecting [telescope](#) “donated” to the college in 1761, which had before delivery been taken off for use in the expedition to Newfoundland for the observation of a transit of the planet Venus across the surface of the sun, the purpose of which was to more accurately determine the distance of the sun from the earth. This surviving instrument was never in fact delivered to Harvard, for the American Revolution intervened. It apparently became part of the plunder of that war, and is presently to be seen at the Science Museum of South Kensington, England.



“Stack of the Artist of Kouroo” Project

the collection, without permission, by an undergraduate.⁶³

ASTRONOMY



July 21: “There was seen at Philadelphia, at seven in the evening, a great fiery meteor, about fifty degrees above the horizon, of bigger apparent diameter than the sun, which exploded in sight of the city with a report like springing of a mine, when were seen thousands of pieces of fire to diverge.”

FALL OF STONES
SKY EVENT

1765

In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

The Sunspot Cycle 1710-1804

MIN / MAX
1710 - 1718
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1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804

63. This student was, of course, then expelled, and you can see the book he attempted to return after the fire, CHRISTIAN WARFARE AGAINST THE DEVIL WORLD AND FLESH by the Reverend John Downname, on display in Houghton Library.



<http://history.hanover.edu/courses/excerpts/260down.html>

ASTRONOMY

ASTRONOMY

August 17: The *Devonshire* delivered from England, for the benefit of [Harvard College](#)'s science students, an Ellicott Regulator Clock with a big shiny pendulum behind the glass door in its handsome mahogany case, to use in conjunction with Harvard's other "philosophical apparatuses" such as telescopes and [astrolabes](#). This



grandfather-type clock was no mere piece of parlor furniture as it had been described at length in the Transactions of the Royal Society as one of the very most accurate timepieces available. It must have enabled many precise scientific measurements. At £35 14s. 0p. it would be the only one of its design to be exported to England's colonies.

HARVARD OBSERVATORY

1766

The 1st BRITISH NAUTICAL [ALMANACK](#) was published (for the year 1767). It contained sun and star tables and tables for lunar distance calculations.

CARTOGRAPHY

"Luckily for Cook, the Nautical Almanac had just been started, and contained tables of the moon which had not previously been available, and which much lightened the calculations."

Periodic [comet](#) Helfenzrieder made a visit. We don't know when it will return.

Above Cumana in what is now Venezuela, there was a meteor storm.

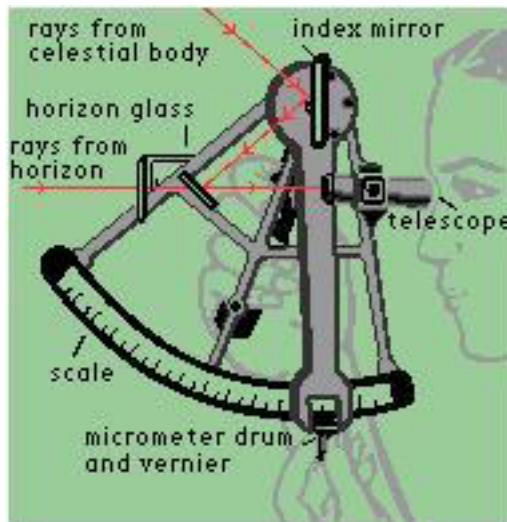
SKY EVENT

ASTRONOMY

ASTRONOMY

1768

Jesse Ramsden improved the [sextant](#) to systematically mark the measures on its arc, thus rendering the mechanism less costly to manufacture and considerably more accurate. Used carefully together in conjunction with books of astronomical tables, such a sextant and an accurate [chronometer](#) would determine both the [latitude](#) and the [longitude](#) of a vessel at sea anytime the weather made possible a sighting of the sun or stars.



1769

[Benjamin Franklin](#) provided a [telescope](#) to [Harvard College](#).

ASTRONOMY

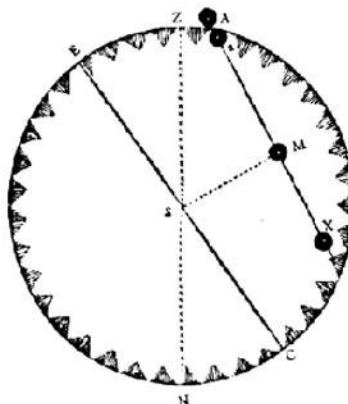
ASTRONOMY

ASTRONOMY

June 3: In Rhode Island, Joseph Wanton was in charge.⁶⁴ From the yard of [Friend Stephen Hopkins](#)'s home (erected



1701, altered 1743)⁶⁵ a group of notables such as [Benjamin West](#) the local “philomath” and Joseph Brown observed the transit of the planet Venus across the face of the sun.⁶⁶



[Benjamin West](#) would publish AN ACCOUNT OF THE OBSERVATION OF VENUS UPON THE SUN THE THIRD DAY OF JUNE 1769, and would soon be awarded honorary degrees by both Harvard College and the [College of Rhode Island](#).

In commemoration, Transit Street and Planet Street in [Providence](#) would receive their names. –On “Transit Street” between Benefit Street (Back Street) and Main Street (Town Street), an observatory of sorts for the event had been constructed.

ASTRONOMY

64. Wanton’s wig, which had been crafted in England in imitation of the wig of the Speaker of the House of Commons, was so immense that it would have seemed preposterous to perch a hat atop it. He therefore was in the habit of carrying his hat under his left arm while holding in his right hand an umbrella (he was the 1st gentleman in Rhode Island to use an umbrella).

65. This structure has been moved a couple of times and I do not presently have the dates of those removes. Initially it stood on South Main Street, then it was moved to 9 Hopkins Street (which may at that time still have been being called Bank Street), and then it was moved to the corner of Hopkins Street and Benefit Street.

66. Would [Friend Stephen Hopkins](#)’s [slave](#) Toney, whom he was refusing to [manumit](#), have been playing “barista,” and carrying drinks out from the house and respectfully serving these notable gentlemen?

ASTRONOMY

ASTRONOMY

THERE will be Five ECLIPSES this Year, 1769.

I. The first of the Sun, January 7th, 9 h. 45m. in the Evening, invisible.

II. The second of the Sun, June 4th, 3 h 43m. in the Morning invisible.

III. The third of the Moon, June 19th in the Morning visible and total as follows.

	<i>h</i>	<i>m</i>
Beginning	1	26
Beginning of total Darknefs	2	40
Middle	3	12
End of total Darknefs	3	42
End of Eclipse	4	58
Duration of total Darknefs	0	30
Duration of Eclipse	3	46
Digits Eclipsed	13	6

IV. The fourth of the Sun, November 28th, at 3h. 5 m in the Morning, invisible.

V. The fifth of the Moon December 13th, visible as follows

	<i>ob</i>	<i>m</i>
Beginning	06	7
Middle	1	29
End	2	51
Duration	2	44
Digits Eclipsed	8	33

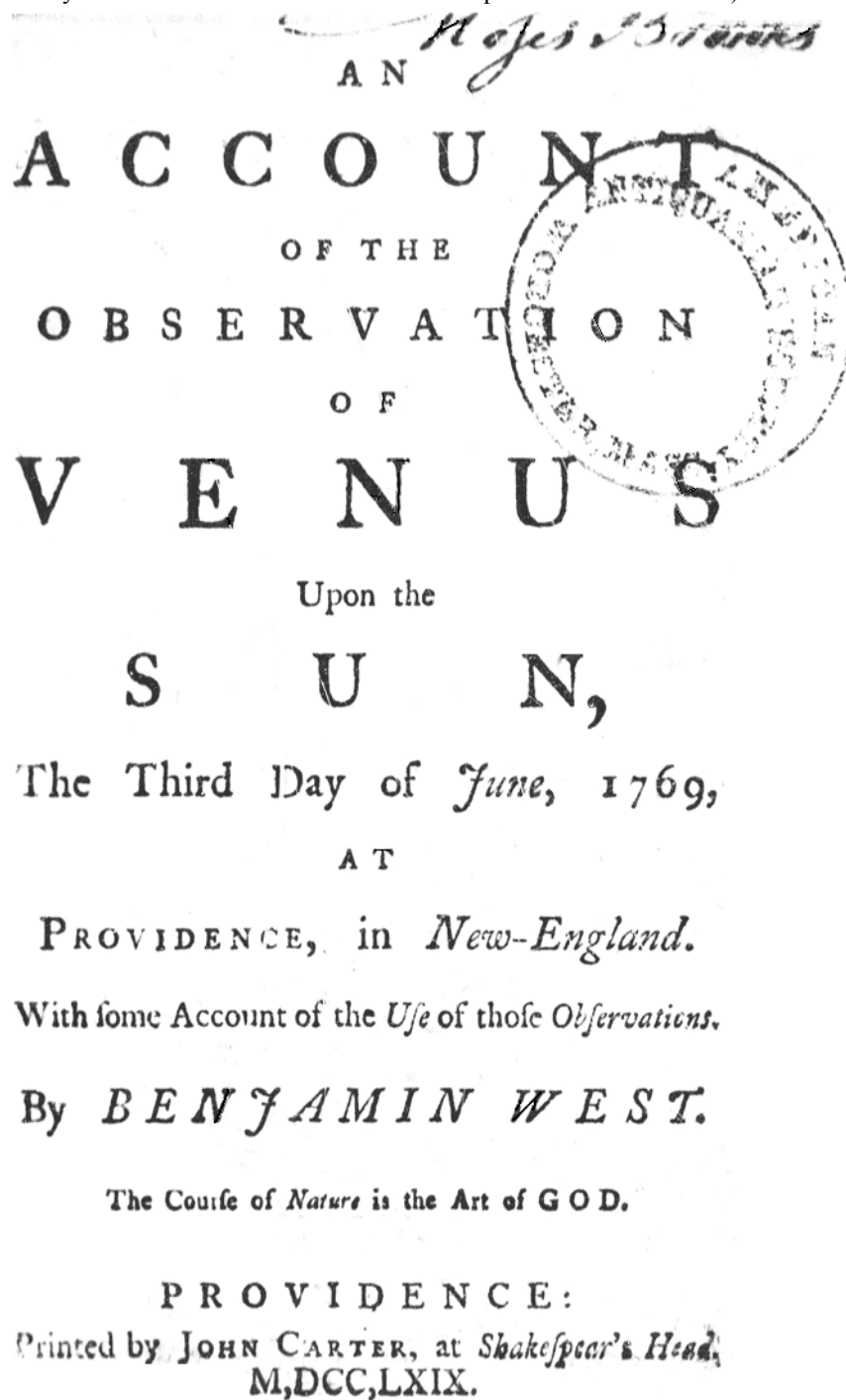
On the third Day of June will happen a most rare Phenomenon, which it is probable not any now living will have another opportunity of beholding, for an accurate observation of which most Civilized Nations have ordered their Astronomers to prepare at the Expence of the Public, some important Principles in Astronomy being thereby to be settled, and which will not happen again till the 8th of December, 1874. This is the passage of Venus over the Disk or Face of the Sun in the Afternoon of said third Day of June 1769, as follows.

Venus will begin to touch the Sun	2h 31m 24sec
Middle of the Transit	5 48 40
Venus leaves the Sun	9 5 56
Duration of the Transit	6 34 32
Latitude of Venus at the Middle	90 47

On the 9th of November the Planet Mercury will appear like a black Spot on the Sun's Disk.

Beginning	2 h 42 m 30 sec P.M.
Middle	5 12 30
End	7 42 30
Duration	5 0 0
Distance of cent. at Middle	7 18

June 3: [Moses Brown](#) would obtain his own copy of the observations made in [Providence, Rhode Island](#) on this day (although I really do not know whether he himself took part in the observations):





ASTRONOMY


ASTRONOMY

August 8: Charles Messier noticed that a great [comet](#) had appeared in Aries. This one would be growing a truly enormous (for an approaching comet; tails of receding comets can be quite a bit longer) tail of not less than 43 degrees as it plunged past the earth toward the sun.

SKY EVENT

September 10: Messier's [comet](#) came as close as it would come to Earth, 0.35 astronomical units. Pingre, who was aboard ship between Teneriffe and Cadiz, alleged that the tail was 90 degrees in length, but acknowledged that at the end of the tail it was so tenuous that the competitive light brought by the rise of Venus above the horizon made several degrees at the end of it no longer visible.

SKY EVENT

What might this mean? 

September 26: Messier's [comet](#) was last seen before it made the last part of its fall to whip around the sun.

SKY EVENT

October 8: Messier's [comet](#) whipped around the sun at a distance of 0.12 astronomical units.

SKY EVENT

October 26: Messier's [comet](#) was again visible as it rose away from the sun.

SKY EVENT


December 3: Last sighting of Messier's Comet, by telescope. [Napoleone di Bonaparte](#) would come to be of the opinion, and Charles Messier would of course concur, that this [comet](#) had been a celestial sign of his birth.

SKY EVENT


1770

In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

The Sunspot Cycle 1710-1804



MIN / MAX
1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804



July: The periodic comet Lexell passed within 0.0151 astronomical units of us — that is, this one missed us by a mere 1,401,200 miles.⁶⁷

ASTRONOMY

This comet was observed by a whole bunch of people, including Benjamin West.

1773

Early Spring 1773: Shortly after Earth’s “close” encounter with Lexell’s Comet, Joseph Jerome de Lalanade offered to the French Academy his “Reflection on comets which can approach the earth.” The academy’s lecture schedule was overcrowded that day, however, and his lecture was dropped, and then a rumor began to circulate that the reason why his lecture had been omitted from the schedule was that the Paris Police had acted to prevent a panic. Shortly the conceit would be making the rounds, that the earth was about to be destroyed by a comet on May 12th.

HERE COME DA JUDGE!

67. This marks the closest that we know a comet has passed to Earth to date, without of course impacting.

ASTRONOMY

ASTRONOMY

May 12, 1773: This day came and passed without the earth being destroyed in a collision with a [comet](#), and the fears of the Parisian public became quelled.

SKY EVENT

THERE WENT DA JUDGE!

1774

November 29: The geographer to His Royal Highness the Prince of Wales, Thomas Jefferys, engraved, and B. Romans issued, one of the machines of empire, "A Map of the most Inhabited part of New England, containing the Provinces of Massachusetts Bay and New Hampshire, with the Colonies of Connecticut and [Rhode Island](#). Divided into Counties and Townships. The whole composed from actual surveys, and its situation adjusted by astronomical observations."



This contained, in addition to a $3\frac{1}{2}$ inch by $2\frac{3}{4}$ inch version of the Lodge plan of Boston of April 1774, a $5\frac{3}{4}$ inch by $5\frac{1}{2}$ inch "plan of Boston Harbor from an accurate survey."

1775

At about this period the circle-dividing engine came into general use in surveying, making it possible to calculate degrees with portable instruments with far greater accuracy than had previously been obtained.

A news item relating to the development of ELECTRIC WALDEN technology:

- Charles, the third Earl Stanhope, made a successful multiplying calculator similar to G.W. von Leibnitz's.

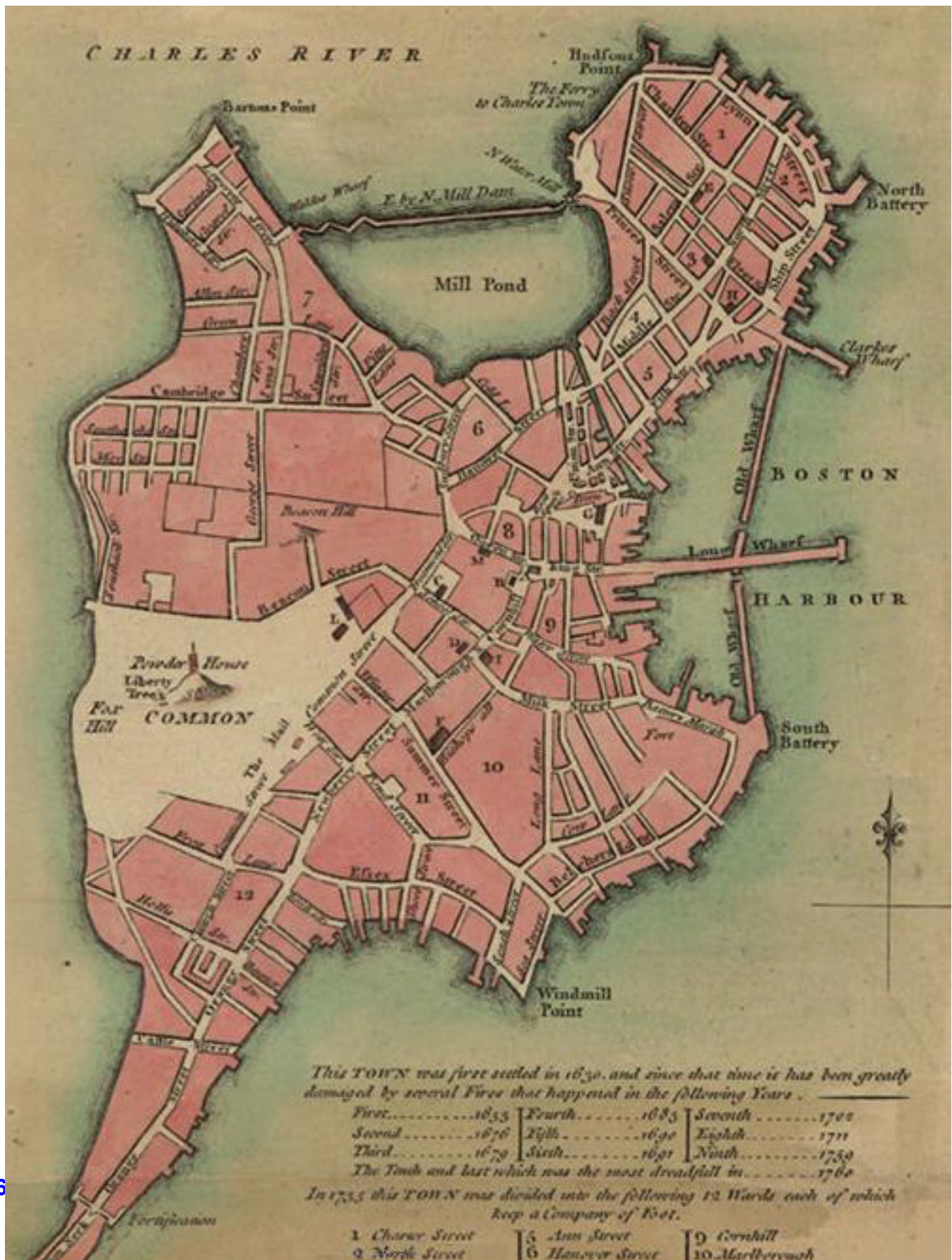


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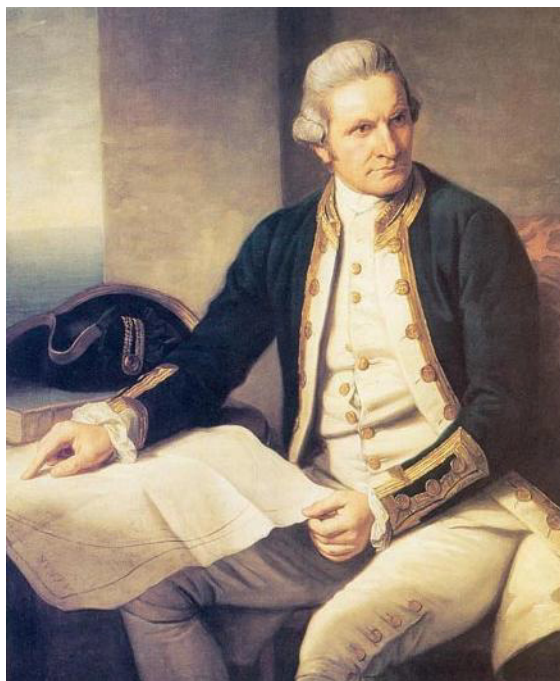
ASTRONOMY



ASTRONOMY

ASTRONOMY

Captain [James Cook](#) –whose 2d voyage was being greatly inconvenienced by having onboard a phenomenally accurate new naval chronometer which enabled him to calculate from the celestial phenomena his vessel’s position with great accuracy– was able to explore in South Atlantic waters, discovering South Georgia and South Sandwich Islands.



HIS 3 VOYAGES, VOL. III

HIS 3 VOYAGES, VOL. IV

Antarctic Explorations

Date	Explorer	Discovery
1738	Jean-Baptiste Bouvet (French)	Bouvet Island
1772	Yves-Joseph Kerguelen (French)	Kerguelen Islands
1775	James Cook (British)	South Georgia and South Sandwich Islands
1821	Nathanael Palmer (American)	Antarctic Peninsula
1821	Fabian von Bellingshausen (Russian)	Peter I Island, Alexander Island
1824	James Weddell (British)	Weddell Sea
1840	Dumont d’Urville (French)	Adelie Land
1841	James Clark Ross (British)	Mt. Erebus, Victoria Land, Ross Ice Shelf

Antarctic Explorations

Date	Explorer	Discovery
1842	Charles Wilkes (American)	Wilkes Land



1776

A news item relating to the development of ELECTRIC WALDEN technology:

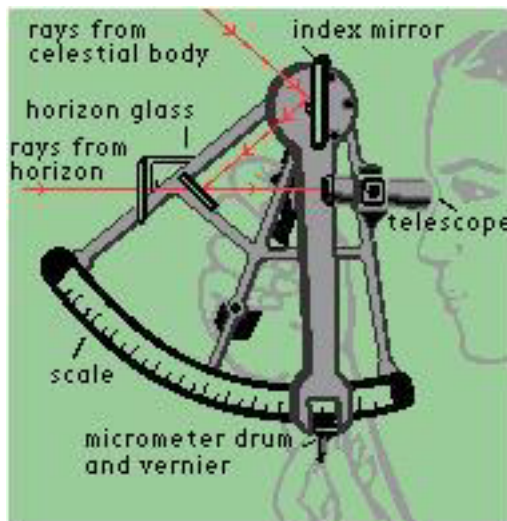
- Mathieus Hahn, somewhere in what is now Germany, made a successful multiplying calculator.

1778

Philip Turnor started to work mapping parts of north central Canada for the Hudson's Bay Co. He used [sextant](#) measurements for both [latitude](#) and [longitude](#).

THE FROZEN NORTH

CARTOGRAPHY



1779

At the age of 14 in Paris, [Sylvestre François Lacroix](#) was calculating the motion of the planets.

In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

The Sunspot Cycle 1710-1804

☰

MIN / MAX
1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804

☰

←

1780

May 19, Friday, mid-morning: As Friend [John Greenleaf Whittier](#) would later record it, this was “the famous Dark Day of New England,” which was “a physical puzzle for many years to our ancestors”:

'Twas on a May-day of the far old year
 Seventeen hundred eighty, that there fell
 Over the bloom and sweet life of the Spring,
 Over the fresh earth and the heaven of noon,
 A horror of great darkness, like the night....



For days the sun had been shining on the northeastern United States from New Jersey to Maine with a reddish hue out of a sky of dull yellow. At mid-morning on this day a blanket of darkness descended and the birds sang their evening songs and the cows began walking back to their barns. Noon was nearly as dark as night, and outdoor travel became difficult. New Haven's Connecticut Journal reported that inside houses, candles were lit as if it were evening. Samuel Williams of Bradford, Connecticut would report that “In some places, the darkness was so great, that persons could not see to read common print in the open air... The extent of this darkness was very remarkable.” The Reverend [Timothy Dwight](#), Yale College president, would report that “It was the general opinion that the day of judgment was at hand.”

The followers of “Universal Friend” [Jemimah Wilkinson](#), having been disappointed that the [millennium](#) had not appeared on April 1st, wondered whether this “Dark Day” might be the end, but again they were disappointed, and again they fell back and regrouped:

destroyed from off the earth ; and then the saints would live
 here a thousand years, which would begin sometime the first
 of April, 1780, being about forty-two months after her first
 beginning to preach, which was not so fully and plainly
 held forth by her as by some of her Apostles ; but the time
 expired, and nothing of that nature happen'd : a while after
 on the 19th of May was the dark day, and then she made
 application of that's being the fulfilling of her prediction
 and what was to happen, and so that doctrine seem'd to
 die away, and there wasn't much said about it afterwards,
 only it would be in the Lord's own time, &c.

People were supposing that a biblical prophecy had come true and Judgement Day had arrived (Abanes, Richard. *END-TIME VISIONS*. NY: Four Walls Eight Windows, 1998, page 217).

The House of Representatives in Hartford, Connecticut adjourned on account of the darkness. At the urging of Colonel Abraham Davenport, however, the governor's council continued its meeting: “Either the day of judgment is at hand or it is not. If it is not, there is no cause for adjournment. If it is, I wish to be found in the line of my duty.”



The Reverend [William Miller](#) and others would not be able to resist seeing in such heavenly displays a fulfillment of words associated with Jesus Christ, “Immediately after the tribulation in those days shall the sun be darkened and the moon shall not give her light, and the stars shall fall from heaven and the powers of heaven shall be shaken” (MATTHEW 24:29). This darkening of the sun, combined with the stars falling in November 1833, would convince many devout believers that the second advent of Jesus was indeed near.

HERE COME DA JUDGE!

From the town records of Ipswich we learn that:



Darkness came on like that of an eclipse. By 9 o'clock, A.M., persons could not see to weave. Candles were lighted to dine by. As the day began prematurely to put on the appearance of twilight, cattle lowed, and fowls went to roost. The darkness of the succeeding evening was almost palpable. Many feared and trembled, lest the end of all things had come. They alone are truly wise, who seek the Lord when the bow of his mercy is over them, as well as when they hear his thunders, and behold his lightnings.

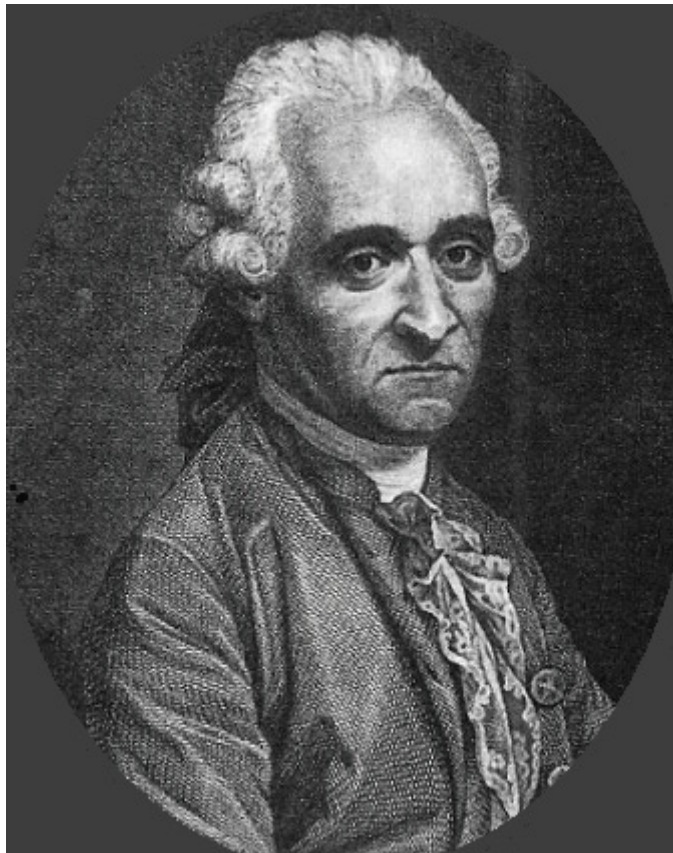
From the diary of Phineas Sprague, as well as from many, many other sources, we can be assured that this day was indeed a quite unusual and memorable one:

This day was the most Remarkable day that ever my eyes beheld the air had bin so full of smoak to an uncommon degree So that wee could scairce see a mountain at two miles distance for 3 or 4 days Past till this day after Noon the smoak all went off to the South at sunset a very black bank of a cloud appeared in the south and west the Nex morning cloudey and thundered in the west about ten oclock it began to Rain and grew vere dark and at 12 was allmost as dark as Nite so that wee was obliged to lite our candels and Eate our dinner by candel lite at Noon day but between 1 and 2 oclock it grew lite again but in the Evening the cloud caim over us again the moon was about the full it was the darkest Nite that ever was seen by us in the world.

This atmospheric effect probably was caused by numerous forest fires in upstate New York and in Canada. In Boston the air was observed to smell like a “malt-house or coal-kiln,” and something resembling ashes settled on pools of rainwater. However, refer also to the date October 15, 1785 for a comparison volcanic phenomenon.

1781

In this year, by the use of a [microscope](#), Fontana was able to provide a description of the appearance of the axon of a brain cell. [Antoine Court de Gébelin](#) helped found the society “Musée de Monsieur,” which eventually would become the “Lycée.” Publication of Volume VIII of his *LE MONDE PRIMITIF, ANALYSÉ ET COMPARÉ AVEC LE MONDE MODERNE* (THE PRIMITIVE WORLD, ANALYZED AND COMPARED TO THE MODERN WORLD) included his famous re-interpretation of the Tarot as an arcane repository of timeless esoteric wisdom. His conviction was that primitive worldwide civilization had been considerably advanced and enlightened, and that this wisdom could now be recovered by one who could decipher the key to the reading of the ancient texts. He is generally recognized as the intellectual godfather of much of modern occultism. The chapter on Tarot with which his name is indelibly associated is a single section in his vast compendium that he published in series from 1773, to a distinguished list of subscribers, headed by Louis XVI. It is to be noted that in his reconstruction of Tarot history, [Court de Gébelin](#) was writing without the benefit any access to the Egyptian writings (the great decipherer [Jean-François Champollion](#) hadn’t even as yet been born). According to him [Egyptian](#) priests had distilled the wisdom of their ancient BOOK OF THOTH into the images of the Tarot, which they had brought to Rome where they made them secretly known to the popes, who had brought them to Avignon in the 14th century, from whence they were introduced into France. Within a couple of years of this publication a fortune-teller “Etteilla” would publish a technique for the reading of tarot cards:





LE MONDE PRIMITIF, I

LE MONDE PRIMITIF, II

LE MONDE PRIMITIF, III

LE MONDE PRIMITIF, IV

LE MONDE PRIMITIF, V

LE MONDE PRIMITIF, VI

LE MONDE PRIMITIF, VII

LE MONDE PRIMITIF, VIII

LE MONDE PRIMITIF, IX

March 13: William Herschel, using a reflector scope, was able to detect at the southern limb of [Mars](#) a “very lucid spot.”⁶⁸

1782

November 12: John Goodricke noticed that the star Algol, in the constellation Perseus, was dimming, and then grew brighter again. Later he would be able to explain this as Algol being a twin system in which the brighter star is being regularly eclipsed by an unseen companion.

ASTRONOMY

68. On the same night he discovered the planet [Uranus](#), which he would of course attempt to name in honor of his royal patron George. (Had the attempt succeeded, one may presume that the royals would have felt they had to throw a costume ball to end all costume balls.)

HDT

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ASTRONOMY





ASTRONOMY

ASTRONOMY

1783

William Herschel made drawings of the surface of [Mars](#) on which it is now possible to recognize the features Sinus Sabaeus and Sinus Meridiani.

John Michell speculated that were the mass of a [star](#) great enough, its gravity would be so overwhelming that even its own light would not be able to pull away from it (the term “black hole” would not, however, be coined until 1967).



ASTRONOMY

ASTRONOMY

Abner Brownell (1756-1851), setting out to “diss” the sect that was collecting around the delusional [Rhode Island](#) “Universal Friend” [Jemimah Wilkinson](#), had Timothy Green print for him in New London, Connecticut a 44-page booklet which he entitled **ENTHUSIASTICAL ERRORS, TRANSPIRED AND DETECTED, BY ABNER BROWNELL, IN A LETTER TO HIS FATHER, BENJAMIN BROWNELL.**

(as on the following screens)

ENTHUSIASTICAL ERRORS,

Transpired and detected,

By ABNER BROWNELL,

In a Letter to his Father,

BENJAMIN BROWNELL.



But when I saw that they walked not uprightly, according to the Truth of the Gospel. Gal. 2. 14.

For he that biddeth him God speed, is Partaker of his evil Deeds. 2 Epist. John, 11 Verse.

And have no Fellowship with the unfruitful Works of Darkness, but rather reprove them—And be not ye Partakers with them. Eph. 5. 11 and 7.

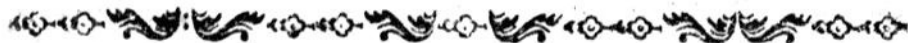
For their Folly shall be manifest unto all Men. 2 Tim. 3. 9.

But ye have not so learned Christ: If so be ye have heard him, and have been taught by him, as the Truth is in Jesus. Eph. 4. 20, 21.

Wherefore come out from among them and be ye separate, saith the Lord. 2 Cor. 6. 17.

And go ye not therefore after them. Luke 21. 8.

This Witness is true. Titus 1. 12.



Printed for the Author, in the Year 1783.



ASTRONOMY

ASTRONOMY

The story he tells is that of an exhorter to goodness rather than of a proclaimer of new doctrine:

and then she will read to them a Description that she has, that the Turks gave antiently concerning our Lord Jesus Christ's outward Appearance, his Shapes, Stature, Features and Complexion, and Habit, with a long loose Gown, and his Hair being black, and curled in his Neck, or upon his Shoulders, and parted upon the Top, after the Manner of the Nazarenes, and then that they may look upon her and see how near she resembles those Descriptions; and so from
Q178

ASTRONOMY

ASTRONOMY

Although Jemimah Wilkinson has been characterized as a cross-dresser, we can see that if she was such, she was such not by the standards of our time (trousers, jacket and tie, etc.) but by the standards of that time (bareheaded indoors, mannish hat outdoors, hairdo not notably of a feminine style).

First then, I shall proceed as I proposed, to shew how I was attached to her Doctrine. In the Year 1778, I heard of a remarkable Person of a Female Preacher from a back Town of Providence, call'd Cumberland, about which there was a Report of something very remarkable and extraordinary, that she was a Person that was said had been dead for the Space of an Hour, and by the mighty Power of God had been rais'd immediately to a State of Health, and had an immediate call to appear in public Testimony to preach to the People: I hearing of her being invited down to Tiverton, I went as by Invitation of my Father with his Company, it being late when we got there, she was in the Improvement of her Sermon; the first outward Appearance seem'd to be something singular and extraordinary, appearing in a different Habit from what is common amongst Women, wearing her Hair curl'd in her Neck, without any other Covering on her Head, except it was when she travel'd out, she put on a Hat much like a Man's, only the Brim flap'd down; her Visage appeared a good Deal bright, with a very agreeable Aspect in her Countenance; her Voice very grum and shrill for a Woman, and seem'd to deliver her Discourse very pathetical and engaging, in which



ASTRONOMY

ASTRONOMY

It would seem that she had prophesied the end of the world, or, at least, allowed some of her disciples so to speculate, the end being on or about April Fool's Day of 1780, or perhaps the "Dark Day" of May 19, 1780:

stroyed from off the earth ; and then the saints would live here a thousand years, which would begin sometime the first of April, 1780, being about forty-two months after her first beginning to preach, which was not so fully and plainly held forth by her as by some of her Apostles ; but the time expired, and nothing of that nature happen'd : a while after on the 19th of May was the dark day, and then she made application of that's being the fulfilling of her prediction and what was to happen, and so that doctrine seem'd to die away, and there wasn't much said about it afterwards, only it would be in the Lord's own time, &c.

(The disreputable information which this former follower had to offer about his former leader consisted merely in the fact that when he had tried to have something of his printed, without first clearing it with "Beft-Friend" Jemimah Wilkinson, for a period the copy of his writing from which the printer had been setting type had been taken from the printer's office, evidently so that Universal Friend might satisfy herself that the writing was not directed against her.)

August 18, early evening: [Friend Luke Howard](#), at eleven years of age, watched a fiery [meteor](#) flash across the skies of western Europe. –Would this be the meteor that inspired the meteorologist?

1784

January 20, Tuesday: In his diary, [Noah Webster, Jr.](#) recorded having sighted a [comet](#) (this was C/1783, a nonperiodic comet which had been being watched since November 19th and would arrive at its perihelion on the 21st).

SKY EVENT

1785

Professor Gaspart Monge had recommended to the young [Sylvestre François Lacroix](#) that he undertake research on partial differential equations and the calculus of variations, and Lacroix had followed his advice. At the age of 20, he sent a memoir of his research to Professor Monge, who presented it to the Académie des Sciences. The young man had also persisted at his early interest in calculating astronomical data, and in this year submitted a new set of solar tables to the Académie des Sciences. He returned to Paris to substitute-teach Marie Jean Antoine Nicolas de Caritat, Marquis de Condorcet’s courses in astronomy and mathematics at the Lycée (Professor Condorcet was preoccupied at the time with the duties of being Inspector General of the Mint). In about this timeframe, Lacroix got married.

In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

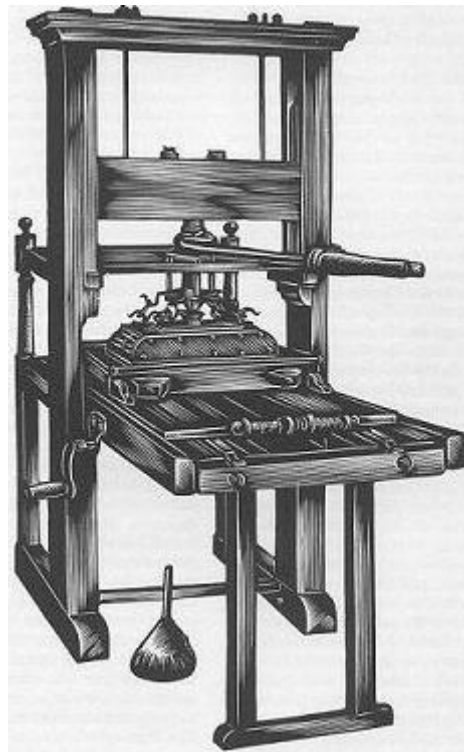
The Sunspot Cycle 1710-1804

	MIN / MAX	
	1710 - 1718	
	1723 - 1727	
	1732 - 1739	
	1744 - 1750	
	1755 - 1762	
	1765 - 1770	
	1775 - 1779	
➡	1785 - 1788	
	1798 - 1804	

October 15: In Montréal, at 1PM on the afternoon, it was as dark as if it were 1AM, except that at some points in the sky one could notice a strange orange glow. Talking about this event among themselves, Montréalers termed this “*la grande noirceur*.” (But see above, under the date May 19, 1780. ➡)

1787

Here is a current woodcut of a press manufactured in this year in Philadelphia by John Goodman, which is still intact and in good condition at the Cumberland County Historical Society in Carlisle, Pennsylvania after use for many years by the printing shop of Joseph Baumann in Ephrata and then by a press in Cumberland County:



THE NEW-ENGLAND [ALMANACK](#) FOR 1787. By Isaac Bickerstaff. [Providence, Rhode Island](#): John Carter.

THE RHODE ISLAND SHEET [ALMANACK](#) FOR 1787. [Providence](#): Bennett Wheeler.

Broadside.

THE NORTH-AMERICAN CALENDAR: OR, THE RHODE-ISLAND [ALMANACK](#) FOR THE YEAR OF OUR LORD CHRIST 1787.... By [Benjamin West](#), A.M., A.A.S., professor of mathematics and astronomy in the [College of Rhode Island](#) (during this year, however, he was teaching mathematics instead at the Protestant Episcopal Academy in Philadelphia). [Providence](#): Printed by Bennett Wheeler. There was an elaborate account of the discovery of a new planet henceforth to be known as “Herschel,” the planet which we now term “Uranus.”

ASTRONOMY

Contains cut of [lunar] eclipse.



(Same, a second edition.) On the title-page “Eleventh of American Independence” is in Old English type.

(Same, a third edition.) There are three scrolls outside of the border on the title-page.

➡

 January 11: The moons Titania and Oberon of the planet Uranus were discovered by William Herschel.

1788

Caroline Herschel discovered a comet which, when it returned again during the 20th Century, would become known as the periodic comet Herschel-Rigollet.

SKY EVENT

In 1843, during Thoreau’s lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

The Sunspot Cycle 1710-1804

☰

MIN / MAX

☰

1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804

←

1789

Benjamin Banneker predicted the solar [eclipse](#) of this year.



ASTRONOMY

August 28: The Saturnian [moon](#) Enceladus was discovered by William Herschel.

1790

During this decade marine [chronometers](#) would be beginning to be generally available but would be expensive. Compared with the number of ships at sea there were relatively few equipped with this valuable instrument.

CARTOGRAPHY

1794

June 16: Rocks don't fall out of a clear sky, everybody knows that. But at about 7PM in Siena, [Italy](#), marring a picture-perfect sky there arose this one dark high cloud which was approaching from the north. There was suddenly noise, which some residents remembered as having been like thunder, while others said it sounded to them like the firing of cannons. The dark cloud became tinged with red as stones thudded into the earth. Checking into this, the citizens of Siena discovered that indeed the maw of [Mount Vesuvius](#) had opened some 18 hours before, and it had transited into its eruptive, non-quiet condition (which phase typically obtains for this particular volcano for between half an year and just shy of 31 years) — but since the active volcano was 320 clicks to the **southwest** but this cloud had been observed to be approaching from the **north**, what to think? The Earl of Bristol, Frederick A. Hervey, visiting, commented that his first objection "was to the fact itself, but of this there are so many eyewitnesses, it seems impossible to withstand their evidence." It would be some 70 years before astronomers discovered that the timing of the eruption of the volcano was just a coincidence, and that this sort of thing is what happens when a stray [asteroid](#) wanders into a trajectory crossing the orbit of the earth.

The stones, constituted of a material which came to be termed "soldanite," including counterfeit ones, would sell briskly to generations of English tourists.

ASTRONOMY



ASTRONOMY

ASTRONOMY

1795

METEORS

December 13: At 3:30PM three laborers in Wold Newton, England watched as an object hurtled from a cloud to gouge a fresh hole in a field outside Wold Cottage. A black stone would be dug out and placed on display at the Gloucester Coffee House in London, and a monument erected over this hole.⁶⁹

1796

February 19: A fall of stones from the sky near Evora, Portugal.

ASTRONOMY

1797

Thomas Wright (representing Great Britain) and Samuel Webber (representing the US) set up an observatory near St. Andrews to determine the [latitude](#) and [longitude](#) of the point to help decide which of two rivers was the St. Croix River mentioned in the Treaty of 1783.

CARTOGRAPHY

The [comet](#) Bouvard-Herschel-Lee passed Earth at a distance of 0.088 astronomical units.

SKY EVENT

Not that this has anything to do with the comet of this year, but in this year the city of Venice changed its calendrical end-of-year convention:

Various Year-End Conventions

Indictio graeca end-of-year convention: The calendar year extended from September 1st of the previous to August 31st of the given year. Conventional in Byzance, South Italy, and Sicily, and until 1087 by the Papal *curia*.

Indictio romana convention: The calendar year began with New Year's day, here either A) December 25th of the previous or B) January 1st of the given year. This calendar convention was used by the Papal *curia* from 1087 on and in late medieval Germany.

Indictio Bedana Convention: The calendar year extended from September 24th of the previous to September 23d of the given year. Introduced by the Venerable Bede, later widely used, especially in Germany and by the Imperial chancellery.

Byzantine Convention: The calendar year extended from September 1st of the previous to August 31st of the given year in accordance with the Byzantine usage of dating the creation of the world.

69. In this year had been published the hypothesis of Ernst F.F. Chladni ON THE ORIGIN OF IRON-MASSSES, which eventually would be accepted as the explanation for such occurrences. In this year, also, William Herschel suggested that beneath its hot clouds the sun might have a dark, cool surface, and that upon this dark, cool surface there might be living beings.



ASTRONOMY

ASTRONOMY

Christmas Convention: The calendar year extended from December 25th of the previous to December 24th of the given year (the convention most widely used in the Middle Ages).

Circumcision Convention: The calendar year extends from January 1st to December 31st, as is the convention here today.

Annunciation Convention: The calendar year began with March 25th of the previous (*stilus pisanus*) or on March 25th of the given year (*stilus florentinus*, *mos anglicanus*).

Venezian Convention: The calendar year extended from March 1st of the given year to the last day of February of the subsequent year. This convention derived from the pre-Caesarian Roman convention used by the Merovingian Franks, and was the official convention in Venice until 1797.

Easter Convention: The calendar year began on the (movable) date of Easter Sunday of the given year. The Easter Convention year went from Easter Sunday (our convention) to Holy Saturday (our convention). Easter Convention was used especially in France until the 16th century (*mos gallicus*). This program calculates Easter only for the time after the Council of Nicea (325CE), assuming that Easter was the first Sunday after the first official full moon on or after the official vernal equinox (March 21st). Easter dates from 1583 on are given according to the Gregorian calendar reform of October 15, 1582, and are calculated with the official full moon. However, not all countries immediately adopted the Gregorian calendar, and some Protestant nations temporarily based their Easter computation on the actual rather than the “official” full moon.



ASTRONOMY

ASTRONOMY

[Sylvestre François Lacroix](#)'s *ÉLÉMENTS D'ALGÈBRE, A L'USAGE DE L'ÉCOLE CENTRALE DES QUATRE-NATIONS* (Paris: Chez Duprat) and *TRAITÉ ÉLÉMENTAIRE D'ARITHMÉTIQUE*. In this year and the following one, his *TRAITÉ DU CALCUL DIFFÉRENTIEL ET DU CALCUL INTÉGRAL* (Paris: Chez Courcier).

At the age of 24, Nathaniel Bowditch found an error in Newton's *PRINCIPIA MATHEMATICA*. At first he thought he must be delusional, because of course such a personage as Sir Isaac could not make mistakes, but finally he persuaded himself to show his calculations to a professor of mathematics, a certain Professor Webber of [Harvard College](#). This personage also was of the opinion that a weighty luminary such as [Isaac Newton](#) would not be guilty of error, but rather it was brash American lads who made calculational mistakes. The following is from an article in the New York Review of April 1839 by Professor [Benjamin Peirce](#), who had started out

as a protégé of Bowditch and thus may have had the story directly from him:



At the very outset of his course, while yet engaged in navigation, when only twenty-four years old, and four years before the publication of the *PRACTICAL NAVIGATOR* under his own name, Bowditch gave a most remarkable proof of his critical acumen by detecting an important error in the *PRINCIPIA* which had escaped the penetration of the acutest geometers. This early evidence of his peculiar talent was far above the comprehension of the professor of mathematics to whom it was shown, and whose objections were quite worthy of the author of Webber's *Mathematics*. But it would be injustice to Webber to forget that he was, at this time, thought to be the first mathematician of New England, and that he looked down from his hillock of glory upon the arithmeticians around him, and saw not a single hand raised to contest his supremacy. The multitude must, indeed, have wondered at the head which could produce two octavo volumes of mathematics; and without presuming to inquire whence the rules of measuring hogsheads and constructing charts were derived, they must have revered, as a kind of inventor of time, the man who had written a theory of dialing, had actually constructed an erect declining sun-dial, and placed it upon the wall of one of the Harvard halls, called Massachusetts. The remains of this dial are still preserved, converted by the sacrilegious brush of the painter into a plain piece of board, square and white. What must have been the astonishment of such a man at receiving from a humble navigator, a pretended correction of the *PRINCIPIA*, of that immortal work whose presence upon his desk was as important to the dignity of the professor, as its contents were inscrutable to his comprehension. Not less intense must have been his surprise, than would be ours be at a similar attack, from an equally obscure source, upon the accuracy of Laplace or Bowditch. He seems to have sneered at the audacity of the youth, and to have undertaken to mystify him with a letter, the intricacy of which might have puzzled even Newton himself, and tells plainly of the confused state of his mind. This singular incident must be regarded as illuminating, less the extent of Webber's attainments, than the superiority of the young seaman to all the mathematicians of his country.

One wonders whether the professor who was a predecessor of [Peirce](#) at Harvard simply neglected to study Nathaniel Bowditch's calculation, or whether he was incompetent: remember that [Harvard](#) at this time was a



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school for preachers, not a school of the sciences.



But Webber's letter, combined with his own native modesty and caution, was not without its effect on Bowditch, and his correction was not, for several years, presented to the American Academy, and published in their transactions.

December 19: A fall of stones from the sky near Benares, India.

ASTRONOMY

1798

There was a strong [Andromedid meteor shower](#) during this year — a shower which we connect with the now-disintegrated periodic Biela's [comet](#).

SKY EVENT

Distortion of image, due to imperfect mixing of the raw materials, had been a characteristic of cast plates of flat glass even after they had been fully polished. At this point the introduction of a process of mechanical stirring of the molten glass, by Guinand, greatly improved glass windows and mirrors.

GLASS WINDOWS



ASTRONOMY

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[Sylvestre François Lacroix](#)'s *TRAITÉ ÉLÉMENTAIRE DE TRIGONOMÉTRIE RECTILIGNE ET SPHÉRIQUE ET D'APPLICATION DE L'ALGÈBRE À LA GÉOMÉTRIE* (Paris: impr. Duprat).

In 1843, during Thoreau's lifetime, regularities would be described in the occurrence of sunspots:

SUNSPOTS

The Sunspot Cycle 1710-1804

MIN / MAX
1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804

December 19: A fall of stones from the sky near Benares, [India](#).

ASTRONOMY

1799

November 12: General [Napoléon Bonaparte](#) announced to France that the constitution of the Year III was abolished.

American astronomer Andrew Ellicot Douglas first documented the Leonid meteor shower from a ship at the edge of the Gulf stream off the Florida Keys (there is an existing woodcut giving a contemporary impression of the shower as seen from that viewpoint). Alexander von Humboldt and his companion Bonpland observed a morning [meteor shower](#) over Cumana (now Venezuela). They were told by the residents there that in 1766 a similar meteor storm had been seen over Cumana.

FALL OF STONES

LEONID METEOR SHOWER

Tausende von Feuerkugeln und Sternschnuppen fielen hintereinander, vier Stunden lang. (...) Nach Bonplands Aussage war gleich zu Anfang der Erscheinung kein Stück am Himmel so groß als drei Mond Durchmesser das nicht jeden Augenblick von Feuerkugeln und Sternschnuppen gewimmelt hätte. Von 4h an hörte die Erscheinung allmählich auf; ... - Humboldt



ASTRONOMY

ASTRONOMY

1800



For the 1st time a steam engine was used in the grinding and polishing of glass for windows and mirrors.

GLASS WINDOWS



January 1, Wednesday: The Dutch East India Company, having gone bankrupt, ceased to exist, its properties reverting to the government of the Netherlands.

Discovery of the 1st [asteroid](#), by Giuseppe Piazzi of Palermo Observatory.

ASTRONOMY

1801



Thomas Young provided support for the theory that light was somehow similar to the waves on the surface of a body of water, through a demonstration of the phenomenon of interference.

HISTORY OF OPTICS

ASTRONOMY



Humans have been noticing and recording the blotches that move across the face of the sun for at least the past several thousands of years. During the 17th Century, or, more precisely, during what is referred to as the Little Ice age, 1645-1715, the sun was observed to be in a period of quiescence now referred to as the Maunder Minimum, during which there were very few sunspots, and those that did appear were usually in the sun's southern hemisphere and moved more slowly than today's sunspots.

We now hypothesize that the sun's condition was what was causing the cooling of the earth, and that the sun's quiescence was caused by its being temporarily in a state (quadripole) in which it had four magnetic poles rather than its usual two (dipole). Observations of stars similar to Sol indicate that this class of G2 stars spends about a quarter of its time in such a state of quiescence, with few sunspots. During such a period the brightness of the sun would decrease approximately four tenths of one percent, sufficient to reduce the general temperature of the earth's atmosphere by one to two degrees Centigrade. Six out of the seven periods of minimal solar magnetism during the past 5,000 to 6,000 years (as evidenced by peaks in the radiocarbon in tree rings) correlate nicely with known intervals of a cooler climate on earth.

At the beginning of the 18th Century the sun returned to its cycle of sunspot activity, so that by 1801 the astronomer William Herschel was able to speculate on the fact that the price of wheat in England had been inversely correlated with the level of sunspot activity. The period of sunspot activity varies from star to star, with the period of our Sol being about 22 years. First our star goes through an 11-year cycle of sunspot activity on one polarity, then its polarity flips and that 11-year cycle is repeated at the opposite polarity. The periodic lows of sunspot activity leave their record on earth in tree trunks, because more carbon 14 is manufactured in the upper atmosphere by galactic cosmic rays while these solar activities are weak.¹

1. This is per an article in Scientific American "The Stellar Dynamo" by Elizabeth Nesme-Ribes, Sallie L. Baliunas, and Dmitry Sokoloff (August 1996, pages 46-52), and Kenneth R. Lang's SUN, EARTH AND SKY (Springer-Verlag, 1995).

ASTRONOMY

Sunspots


Min/Max
1710 - 1718
1723 - 1727
1732 - 1739
1744 - 1750
1755 - 1762
1765 - 1770
1775 - 1779
1785 - 1788
1798 - 1804
1810 - 1817
1823 - 1830
1834 - 1837
1843 - 1849
1857 - 1860
1867 - 1872
1879 - 1884
1889 - 1894
1901 - 1905
1913 - 1917
1924 - 1928
1933 - 1938
1944 - 1948
1954 - 1958
1965 - 1970
1976 - 1980
1986 - 1989
199? - 19??





ASTRONOMY

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 January 1, Thursday: In his Palermo observatory, Giuseppe Piazzi became the 1st person to discover an [asteroid](#). He would name this object Ceres (Ceres had been the Roman goddess associated with Sicily).

The Act of Union of Great Britain (England + Scotland) and Ireland came into force, with the Union Jack hoisted on the Tower of London to the firing of guns as the official flag of that United Kingdom. George III assumed the title King of Great Britain and Ireland. Due to the union of England and Ireland, it began to be a flaming question in British politics, whether any Catholic would ever be allowed to hold any government office. The 1st census put the population of England and Wales at 9,168,000, of Britain at nearly 11,000,000 (75% rural). The Irish population meanwhile was at 5,000,000.


London, population 864,000.

Paris, population 547,000.

1802

 March 28: Discovery of a 2nd [asteroid](#), Palla, by Heinrich Wilhelm Olbers.


1803

 There was a spectacular shower of stones at L'Aigle in Normandy, after which evidence of some 3,000 separate strikes was obtained. But by this time the hypothesis of Ernst F.F. Chladni ON THE ORIGIN OF IRON-MASSSES, published in 1795, was receiving general acceptance among natural philosophers.

METEOR

FALL OF STONES

1804

 September 1, Saturday: Karl Ludwig Harding discovered Juno, the 3d [asteroid](#) to be viewed from Earth. Friend [Stephen Wanton Gould](#) wrote in his journal:

7 day 1 of 9 M 1804/ I hardly know for what I am filling up paper, tho it seems sometimes as if thins occurs that may be profitable for me to keep in remembrance. Not expecting that my writing will be perused by any but myself, therefore if it should ever so happen that it should, & they meet with some things which may expose my simplicity, It may be rememeber'd it was written for my own purpose to adjust my memory to other diverse reasons, already mentioned some months past — This morning several of my particular & endeared friends have called to see me of which I was glad, & with one of them had a considerable religious conversation upon a passage of scripture, which he does not understand, as it was by our primitive Friends,



ASTRONOMY

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*& tho we did not view the subject alike, yet we conversed in friendship, & I can say that my spirit felt severely humbled thro' the corse of the conversation.
This afternoon am going to Narragansett on business where I expect to stay tomorrow, which is first day—*

RELIGIOUS SOCIETY OF FRIENDS

→ September 2: The [asteroid](#) Juno was announced.

ASTRONOMY

1805

→ By this point the mechanical stirring of molten glass for the casting of glass plates for mirrors and windows had been perfected, and problems of distortion were pretty much a thing of the past.

GLASS WINDOWS

→ November 10, Sunday: Pons sighted a [comet](#) which, on its return in 1826, would be anticipated and watched for as a probable periodic by Captain Wilhelm von Biela — the one which would become known as Biela's Comet.

SKY EVENT

1806

→ THE NEW-ENGLAND [ALMANACK](#) FOR 1806. By Isaac Bickerstaff. [Providence](#), [Rhode Island](#): John Carter.

THE RHODE-ISLAND [ALMANAC](#) FOR 1806. By Benjamin West. [Newport](#) Oliver Farnsworth.

THE COLUMBIAN CALENDAR OR [ALMANAC](#) FOR 1806. By Remington Southwick. [Newport](#). Printed for the author.

A [LUNAR CALENDAR](#) FOR A. M. 5566. (1806) By [Moses Lopez](#). [Newport](#): Newport Mercury (a copy is preserved at the [Touro Synagogue](#)).

This Almanac was calculated for the Jews who at this time had a very prosperous colony in Newport.

→ The periodic [comet](#) Biela passed 0.0366 astronomical units from Earth, and this time was at its brightest ever.

SKY EVENT



ASTRONOMY

ASTRONOMY



March 15: The Grand Duchy of Cleves and Berg was created and Joachim Murat, brother-in-law to the Emperor Napoléon, became its Grand Duke.

At 5:30PM a “chondrite” meteor crashed to Earth outside Alais, France. It would be on the basis of this one that the type of meteor (one containing carbon and organic-like chemicals) would be identified.

SKY EVENT



June 16, Monday: Friend [Stephen Wanton Gould](#) wrote in his journal:

2 day / Owing to the great Eclipse of the Sun which happened this morning & was nearly total, the meeting began buisness [sic] after a solid silence of about fifteen minutes which is much sooner than is common – at near eleven O Clock the meeting broke, as it was very dark & adjourned to three in the Afternoon – In the afternoon we met & entered on the State of Society as represented by the Queries which drew forth the testimonys of divers living members among whom were Wm Crotch, Enoch Dorland, Isaac Bonsall, Daniel Quinby & others.

RELIGIOUS SOCIETY OF FRIENDS

A total [eclipse](#) of the sun was visible from San Diego, California to New-York. In the Indiana Territory, the Shawnee prophet Tenskwatawa accurately predicted this eclipse. As a result of observing this eclipse from Kinderhook, New York, José Joaquin de Ferrer came up with the name “corona” to designate the faint outer glowing atmosphere of the sun visible only during such a total occultation. On Boston Neck the grazing cattle began their evening walk home at noon as the eclipse blackened the cloudless sky. Observing this phenomenon, [William Cranch Bond](#) determined to become an astronomer. In the garden behind his home on Chestnut Street⁷⁰ in Salem sat Nathaniel Bowditch with a [telescope](#), and a lantern by which to consult his watch.

*“The moon was seen like a black spot in the heavens surrounded by light like that of twilight.
Several of the fixed stars were visible to the naked eye.
At 11h 32’ 18” the light burst forth with great splendor.”*

SKY EVENT

HARVARD OBSERVATORY

Many years later, a description of this event belatedly recollected by [James Fenimore Cooper](#) in about the year 1831 would belatedly appear in 1869 in [Putnam’s Monthly Magazine](#) (Volume 21, pages 352-359):

THE ECLIPSE. FROM AN UNPUBLISHED MS. OF JAMES FENIMORE COOPER.

Note by the Editor.— During Mr. Cooper’s residence at Paris, he wrote, at the request of an English friend, his recollections of the great eclipse of 1806. This article, which is undated, must have been written about the year 1831, or twenty-five years after the eclipse. His memory was at that period of his life very clear and tenacious, where events of importance were concerned. From some accidental cause, this article was never sent to England, but lay, apparently forgotten, among Mr. Cooper’s papers, where it was found after his death. At the date of the eclipse, the writer was a young sailor of seventeen, just returned from a cruise. At the time of writing these

70. Now 12 Chestnut Street.



ASTRONOMY

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recollections, he had been absent from his old home in Otsego County some fifteen years, and his affectionate remembrance of the ground may be traced in many little touches, which would very possibly have been omitted under other circumstances. S.F.C.

THE eclipse of the sun, which you have requested me to describe, occurred in the summer of 1806, on Monday, the 16th of June. Its greatest depth of shadow fell upon the American continent, somewhere about the latitude of 42 deg. I was then on a visit to my parents, at the home of my family, among the Highlands of Otsego, in that part of the country where the eclipse was most impressive. My recollections of the great event, and the incidents of the day, are as vivid as if they had occurred but yesterday. Lake Otsego, the headwaters of the Susquehanna, lies as nearly as possible in latitude 42 deg. The village, which is the home of my family, is beautifully situated at the foot of the lake, in a valley lying between two nearly parallel ranges of heights, quite mountainous in character. The Susquehanna, a clear and rapid stream, flowing from the southeastern shore of the lake, is crossed by a high wooden bridge, which divides the main street of the little town from the lawns and meadows on the eastern bank of the river. Here were all the materials that could be desired, lake, river, mountain, wood, and the dwellings of man, to give full effect to the varied movement of light and shadow through that impressive day. Throughout the belt of country to be darkened by the eclipse, the whole population were in a state of almost anxious expectation for weeks before the event. On the eve of the 16th of June, our family circle could think or talk of little else. I had then a father and four brothers living, and as we paced the broad hall of the house, or sat about the family board, our conversation turned almost entirely upon the movements of planets and comets, occultations and eclipses. We were all exulting in the feeling that a grand and extraordinary spectacle awaited us – a spectacle which millions then living could never behold. There may have been a tinge of selfishness in the feeling that we were thus favored beyond others, and yet, I think, the emotion was too intellectual in its character to have been altogether unworthy. Many were the prophecies regarding the weather, the hopes and fears expressed by different individuals, on this important point, as evening drew near. A passing cloud might veil the grand vision from our sight; rain or mist would sadly impair the sublimity of the hour. I was not myself among the desponding. The great barometer in the hall – one of the very few then found in the State, west of Albany – was carefully consulted. It was propitious. It gave promise of dry weather. Our last looks that night, before sleep fell on us, were turned toward the starlit heavens. And the first movement in the morning was to the open window – again to examine the sky. When I rose from my bed, in the early morning, I found the heavens serene, and cloudless. Day had dawned, but the shadows of night were still lingering over the valley. For a moment, my eye rested on the familiar view – the limpid lake, with its setting of luxuriant woods and farms, its graceful bay and varied points, the hills where every cliff and cave and glen had been trodden a thousand times by my boyish feet – all this was dear to me as the face of a friend.



And it appeared as if the landscape, then lovely in summer beauty, were about to assume something of dignity hitherto unknown – were not the shadows of a grand eclipse to fall upon every wave and branch within a few hours! There was one object in the landscape which a stranger would probably have overlooked, or might perhaps have called unsightly, but it was familiar to every eye in the village, and endowed by our people with the honors of an ancient landmark – the tall gray trunk of a dead and branchless pine, which had been standing on the crest of the eastern hill, at the time of the foundation of the village, and which was still erect, though rocked since then by a thousand storms. To my childish fancy, it had seemed an imaginary flag-staff, or, in rustic parlance, the “liberty pole” of some former generation; but now, as I traced the familiar line of the tall trunk, in its peculiar shade of silvery gray, it became to the eye of the young sailor the mast of some phantom ship. I remember greeting it with a smile, as this was the first glance of recognition given to the old ruin of the forest since my return. But an object of far higher interest suddenly attracted my eye. I discovered a star – a solitary star – twinkling dimly in a sky which had now changed its hue to a pale grayish twilight, while vivid touches of coloring were beginning to flush the eastern sky. There was absolutely no other object visible in the heavens – cloud there was none, not even the lightest vapor. That lonely star excited a vivid interest in my mind. I continued at the window gazing, and losing myself in a sort of day-dream. That star was a heavenly body, it was known to be a planet, and my mind was filling itself with images of planets and suns. My brain was confusing itself with vague ideas of magnitude and distance, and of the time required by light to pierce the apparently illimitable void that lay between us – of the beings who might inhabit an orb like that, with life, feeling, spirit, and aspirations like my own. Soon the sun himself rose into view. I caught a glimpse of fiery light glowing among the branches of the forest, on the eastern mountain. I watched, as I had done a hundred times before, the flushing of the skies, the gradual illuminations of the different hills, crowned with an undulating and ragged outline of pines, nearly two hundred feet in height, the golden light gliding silently down the breast of the western mountains, and opening clearer views of grove and field, until lake, valley, and village lay smiling in one cheerful glow of warm sunshine. Our family party assembled early. We were soon joined by friends and connections, all eager and excited, and each provided with a colored glass for the occasion. By nine o’clock the cool air, which is peculiar to the summer nights in the Highlands, had left us, and the heat of midsummer filled the valley. The heavens were still absolutely cloudless, and a more brilliant day never shone in our own bright climate. There was not a breath of air, and we could see the rays of heat quivering here and there on the smooth surface of the lake. There was every appearance of a hot and sultry noontide. We left the house, and passed beyond the grounds into the broad and grassy street which lay between the gates and the lake. Here there were no overhanging branches to obstruct the view; the heavens, the wooded mountains, and the limpid sheet of water before us, were all distinctly seen. As



the hour for the eclipse drew near, our eagerness and excitement increased to an almost boyish impatience. The elders of the party were discussing the details of some previous eclipse: leaving them to revive their recollections, I strolled away, glass in hand, through the principal streets of the village. Scarce a dwelling, or a face, in the little town, that was not familiar to me, and it gave additional zest to the pleasure of a holiday at home, to meet one's townsfolk under the excitement of an approaching eclipse. As yet there was no great agitation, although things wore a rather unusual aspect for the busy hours of a summer's day. Many were busy with their usual tasks, women and children were coming and going with pails of water, the broom and the needle were not yet laid aside, the blacksmith's hammer and the carpenter's plane were heard in passing their shops. Loaded teams, and travellers in waggons, were moving through the streets; the usual quiet traffic at the village counters had not yet ceased. A farm-waggon, heavily laden with hay, was just crossing the bridge, coming in from the fields, the driver looking drowsy with sleep, wholly unconscious of the movement in the heavens. The good people in general, however, were on the alert; at every house some one seemed to be watching, and many groups were passed, whose eager up-turned faces and excited conversation spoke the liveliest interest. It was said, that there were not wanting one or two philosophers of the skeptical school, among our people, who did not choose to commit themselves to the belief in a total eclipse of the sun – simply because they had never seen one. Seeing is believing, we are told, though the axiom admits of dispute. But what these worthy neighbors of ours had not seen, no powers of reasoning, or fulness of evidence, could induce them to credit. Here was the dignity of human reason! Here was private judgment taking a high stand! Anxious to witness the conversion of one of these worthies, with boyish love of fun I went in quest of him. He had left the village, however, on business. But, true to his principles, before mounting his horse that morning, he had declared to his wife that "he was not running away from that eclipse;" nay, more, with noble candor, he averred that if the eclipse did overtake him, in the course of his day's journey, "he would not be above acknowledging it!" This was highly encouraging. I had scarcely returned to the family party, left on the watch, when one of my brothers, more vigilant, or with clearer sight than his companions, exclaimed that he clearly saw a dark line, drawn on the western margin of the sun's disc! All faces were instantly turned upwards, and through the glasses we could indeed now see a dusky, but distinct object, darkening the sun's light. An exclamation of delight, almost triumphant, burst involuntarily from the lips of all. We were not to be disappointed, no cloud was there to veil the grand spectacle; the vision, almost unearthly in its sublime dignity, was about to be revealed to us. In an incredibly short time, the oval formation of the moon was discerned. Another joyous burst of delight followed, as one after another declared that he beheld with distinctness the dark oval outline, drawn against the flood of golden light. Gradually, and at first quite imperceptibly to our sight, that dark and mysterious sphere gained upon the light, while a feeling of watchful stillness, verging upon



reverence, fell upon our excited spirits. As yet there was no change perceptible in the sunlight falling upon lake and mountain; the familiar scene wore its usual smiling aspect, bright and glowing as on other days of June. The people, however, were now crowding into the streets – their usual labors were abandoned – forgotten for the moment – and all faces were turned upward. So little, however, was the change in the power of the light, that to a careless observer it seemed more the gaze of faith, than positive perception, which turned the faces of all upward. Gradually a fifth, and even a fourth, of the sun's disc became obscured, and still the unguarded eye could not endure the flood of light – it was only with the colored glass that we could note the progress of the phenomenon. The noon-day heat, however, began to lessen, and something of the coolness of early morning returned to the valley. I was looking upward, intently watching for the first moment where the dark outline of the moon should be visible to the naked eye, when an acquaintance passed. "Come with me!" he said quietly, at the same moment drawing his arm within my own, and leading me away. He was a man of few words, and there was an expression in his face which induced me to accompany him without hesitation. He led me to the Court House, and from thence into an adjoining building, and into a room then occupied by two persons. At a window, looking upward at the heavens, stood a figure which instantly riveted my attention. It was a man with haggard face, and fettered arms, a prisoner under sentence of death. By his side was the jailor. A painful tragedy had been recently enacted in our little town. The schoolmaster of a small hamlet in the county had beaten a child under his charge very severely – and for a very trifling error. The sufferer was a little girl, his own niece, and it was said that natural infirmity had prevented the child from clearly pronouncing certain words which her teacher required her to utter distinctly. To conquer what he considered the obstinacy of the child, this man continued to beat her so severely that she never recovered from the effects of the blows, and died some days after. The wretched man was arrested, tried for murder, condemned, and sentenced to the gallows. This was the first capital offence in Otsego County. It produced a very deep impression. The general character of the schoolmaster had been, until that evil hour, very good, in every way. He was deeply, and beyond all doubt unfeignedly, penitent for the crime into which he had been led, more, apparently, from false ideas of duty, than from natural severity of temper. He had been entirely unaware of the great physical injury he was doing the child. So great was his contrition, that public sympathy had been awakened in his behalf, and powerful petitions had been sent to the Governor of the State, in order to obtain a respite, if not a pardon. But the day named by the judge arrived without a return of the courier. The Governor was at his country-house, at least eighty miles beyond Albany. The petition had been kept to the last moment, for additional signatures, and the eighty miles to be travelled by the courier, after reaching Albany, had not been included in the calculation. No despatch was received, and there was every appearance that there would be no reprieve. The day arrived – throngs of people from Chenango, and Unadilla, and from the valley of the Mohawk, poured into the village, to



witness the painful, and as yet unknown, spectacle of a public execution. In looking down, from an elevated position, upon the principal street of the village that day, it had seemed to me paved with human faces. The hour struck, the prisoner was taken from the jail, and, seated, as is usual, on his coffin, was carried to the place of execution, placed between two ministers of the gospel. His look of utter misery was beyond description. I have seen other offenders expiate for their crimes with life, but never have I beheld such agony, such a clinging to life, such mental horror at the nearness of death, as was betrayed by this miserable man. When he approached the gallows, he rose from his seat, and wringing his fettered hands, turned his back upon the fearful object, as if the view were too frightful for endurance. The ministers of the gospel succeeded at length in restoring him to a decent degree of composure. The last prayer was offered, and his own fervent "Amen!" was still sounding, hoarse, beseeching, and almost despairing, in the ears of the crowd, when the respite made its tardy appearance. A short reprieve was granted, and the prisoner was carried back to the miserable cell from which he had been drawn in the morning. Such was the wretched man who had been brought from his dungeon that morning, to behold the grand phenomenon of the eclipse. During the twelve-month previous, he had seen the sun but once. The prisons of those days were literally dungeons, cut off from the light of day. That striking figure, the very picture of utter misery, his emotion, his wretchedness, I can never forget. I can see him now, standing at the window, pallid and emaciated by a year's confinement, stricken with grief, his cheeks furrowed with constant weeping, his whole frame attesting the deep and ravaging influences of conscious guilt and remorse. Here was a man drawn from the depths of human misery, to be immediately confronted with the grandest natural exhibition in which the Creator deigns to reveal his Omnipotence to our race. The wretched criminal, a murderer in fact, though not in intention, seemed to gaze upward at the awful spectacle, with an intentness and a distinctness of mental vision far beyond our own, and purchased by an agony scarcely less bitter than death. It seemed as if, for him, the curtain which veils the world beyond the grave, had been lifted. He stood immovable as a statue, with uplifted and manacled arms and clasped hands, the very image of impotent misery and wretchedness. Perhaps human invention could not have conceived of a more powerful moral accessory, to heighten the effect of the sublime movement of the heavenly bodies, than this spectacle of penitent human guilt afforded. It was an incident to stamp on the memory for life. It was a lesson not lost on me. When I left the Court House, a sombre, yellowish, unnatural coloring was shed over the country. A great change had taken place. The trees on the distant heights had lost their verdure and their airy character; they were taking the outline of dark pictures graven upon an unfamiliar sky. The lake wore a lurid aspect, very unusual. All living creatures seemed thrown into a state of agitation. The birds were fluttering to and fro, in great excitement; they seemed to mistrust that this was not the gradual approach of evening, and were undecided in their movements. Even the dogs – honest creatures – became uneasy, and drew closer to their masters. The



eager, joyous look of interest and curiosity, which earlier in the morning had appeared in almost every countenance, was now changed to an expression of wonder or anxiety or thoughtfulness, according to the individual character. Every house now gave up its tenants. As the light failed more and more with every passing second, the children came flocking about their mothers in terror. The women themselves were looking about uneasily for their husbands. The American wife is more apt than any other to turn with affectionate confidence to the stronger arm for support. The men were very generally silent and grave. Many a laborer left his employment to be near his wife and children, as the dimness and darkness increased. I once more took my position beside my father and my brothers, before the gates of our own grounds. The sun lay a little obliquely to the south and east, in the most favorable position possible for observation. I remember to have examined, in vain, the whole dusky canopy in search of a single cloud. It was one of those entirely unclouded days, less rare in America than in Europe. The steadily waning light, the gradual approach of darkness, became the more impressive as we observed this absolutely transparent state of the heavens. The birds, which a quarter of an hour earlier had been fluttering about in great agitation, seemed now convinced that night was at hand. Swallows were dimly seen dropping into the chimneys, the martins returned to their little boxes, the pigeons flew home to their dove-cots, and through the open door of a small barn we saw the fowls going to roost. The usual flood of sunlight had now become so much weakened, that we could look upward long, and steadily, without the least pain. The sun appeared like a young moon of three or four days old, though of course with a larger and more brilliant crescent. Looking westward a moment, a spark appeared to glitter before my eye. For a second I believed it to be an optical illusion, but in another instant I saw it plainly to be a star. One after another they came into view, more rapidly than in the evening twilight, until perhaps fifty stars appeared to us, in a broad, dark zone of the heavens, crowning the pines on the western mountain. This wonderful vision of the stars, during the noontide hours of day, filled the spirit with singular sensations. Suddenly one of my brothers shouted aloud, "The moon!" Quicker than thought, my eye turned eastward again, and there floated the moon, distinctly apparent, to a degree that was almost fearful. The spherical form, the character, the dignity, the substance of the planet, were clearly revealed as I have never beheld them before, or since. It looked grand, dark, majestic, and mighty, as it thus proved its power to rob us entirely of the sun's rays. We are all but larger children. In daily life we judge of objects by their outward aspect. We are accustomed to think of the sun, and also of the moon, as sources of light, as etherial, almost spiritual, in their essence. But the positive material nature of the moon was now revealed to our senses, with a force of conviction, a clearness of perception, that changed all our usual ideas in connection with the planet. This was no interposition of vapor, no deceptive play of shadow; but a vast mass of obvious matter had interposed between the sun above us and the earth on which we stood. The passage of two ships at sea, sailing on opposite courses, is scarcely more obvious than



this movement of one world before another. Darkness like that of early night now fell upon the village. My thoughts turned to the sea. A sailor at heart, already familiar with the face of the ocean, I seemed, in mental vision, to behold the grandeur of that vast pall of supernatural shadow falling suddenly upon the sea, during the brightest hour of the day. The play of light and shade upon the billows, always full of interest, must at that hour have been indeed sublime. And my fancy was busy with pictures of white-sailed schooners, and brigs, and ships, gliding like winged spirits over the darkened waves. I was recalled by a familiar and insignificant incident, the dull tramp of hoofs on the village bridge. A few cows, believing that night had overtaken them, were coming homeward from the wild open pastures about the village. And no wonder the kindly creatures were deceived, the darkness was now much deeper than the twilight which usually turns their faces homeward; the dew was falling perceptibly, as much so as at any hour of the previous night, and the coolness was so great that the thermometer must have fallen many degrees from the great heat of the morning. The lake, the hills, and the buildings of the little town were swallowed up in the darkness. The absence of the usual lights in the dwellings rendered the obscurity still more impressive. All labor had ceased, and the hushed voices of the people only broke the absolute stillness by subdued whispering tones. "Hist! The whippoorwill!" whispered a friend near me; and at the same moment, as we listened in profound silence, we distinctly heard from the eastern bank of the river the wild, plaintive note of that solitary bird of night, slowly repeated at intervals. The song of the summer birds, so full in June, had entirely ceased for the last half hour. A bat came flitting about our heads. Many stars were now visible, though not in sufficient number to lessen the darkness. At one point only in the far distant northern horizon, something of the brightness of dawn appeared to linger. At twelve minutes past eleven, the moon stood revealed in its greatest distinctness – a vast black orb, so nearly obscuring the sun that the face of the great luminary was entirely and absolutely darkened, though a corona of rays of light appeared beyond. The gloom of night was upon us. A breathless intensity of interest was felt by all. There would appear to be something instinctive in the feeling with which man gazes at all phenomena in the heavens. The peaceful rainbow, the heavy clouds of a great storm, the vivid flash of electricity, the falling meteor, the beautiful lights of the aurora borealis, fickle as the play of fancy, – these never fail to fix the attention with something of a peculiar feeling, different in character from that with which we observe any spectacle on the earth. Connected with all grand movements in the skies there seems an instinctive sense of inquiry, of anxious expectation; akin to awe, which may possibly be traced to the echoes of grand Christian prophecies, whispering to our spirits, and endowing the physical sight with some mysterious mental prescience. In looking back to that impressive hour, such now seem to me the feelings of the youth making one of that family group, all apparently impressed with a sensation of the deepest awe – I speak with certainty – a clearer view than I had ever yet had of the majesty of the Almighty, accompanied with a



humiliating, and, I trust, a profitable sense of my own utter insignificance. That movement of the moon, that sublime voyage of the worlds, often recurs to my imagination, and even at this distant day, as distinctly, as majestically, and nearly as fearfully, as it was then beheld. A group of silent, dusky forms stood near me; one emotion appeared to govern all. My father stood immovable, some fifteen feet from me, but I could not discern his features. Three minutes of darkness, all but absolute, elapsed. They appeared strangely lengthened by the intensity of feeling and the flood of overpowering thought which filled the mind. Thus far the sensation created by this majestic spectacle had been one of humiliation and awe. It seemed as if the great Father of the Universe had visibly, and almost palpably, veiled his face in wrath. But, appalling as the withdrawal of light had been, most glorious, most sublime, was its restoration! The corona of light above the moon became suddenly brighter, the heavens beyond were illuminated, the stars retired, and light began to play along the ridges of the distant mountains. And then a flood of grateful, cheering, consoling brightness fell into the valley, with a sweetness and a power inconceivable to the mind, unless the eye has actually beheld it. I can liken this sudden, joyous return of light, after the eclipse, to nothing of the kind that is familiarly known. It was certainly nearest to the change produced by the swift passage of the shadow of a very dark cloud, but it was the effect of this instantaneous transition, multiplied more than a thousand fold. It seemed to speak directly to our spirits, with full assurance of protection, of gracious mercy, and of that Divine love which has produced all the glorious combinations of matter for our enjoyment. It was not in the least like the gradual dawning of day, or the actual rising of the sun. There was no gradation in the change. It was sudden, amazing, like what the imagination would teach us to expect of the advent of a heavenly vision. I know that philosophically I am wrong; but, to me, it seemed that the rays might actually be seen flowing through the darkness in torrents, till they had again illuminated the forest, the mountains, the valley, and the lake with their glowing, genial touch. There was another grand movement, as the crescent of the sun reappeared, and the moon was actually seen steering her course through the void. Venus was still shining brilliantly. This second passage of the moon lasted but a moment, to the naked eye. As it ceased, my eye fell again on the scene around me. The street, now as distinctly seen as ever, was filled with the population of the village. Along the line of road stretching for a mile from the valley, against the side of the mountain, were twenty waggons bearing travellers, or teams from among the hills. All had stopped on their course, impelled, apparently, by unconscious reverence, as much as by curiosity, while every face was turned toward heaven, and every eye drank in the majesty of the sight. Women stood in the open street, near me, with streaming eyes and clasped hands, and sobs were audible in different directions. Even the educated and reflecting men at my side continued silent in thought. Several minutes passed, before the profound impressions of the spectacle allowed of speech. At such a moment the spirit of man bows in humility before his Maker. The changes

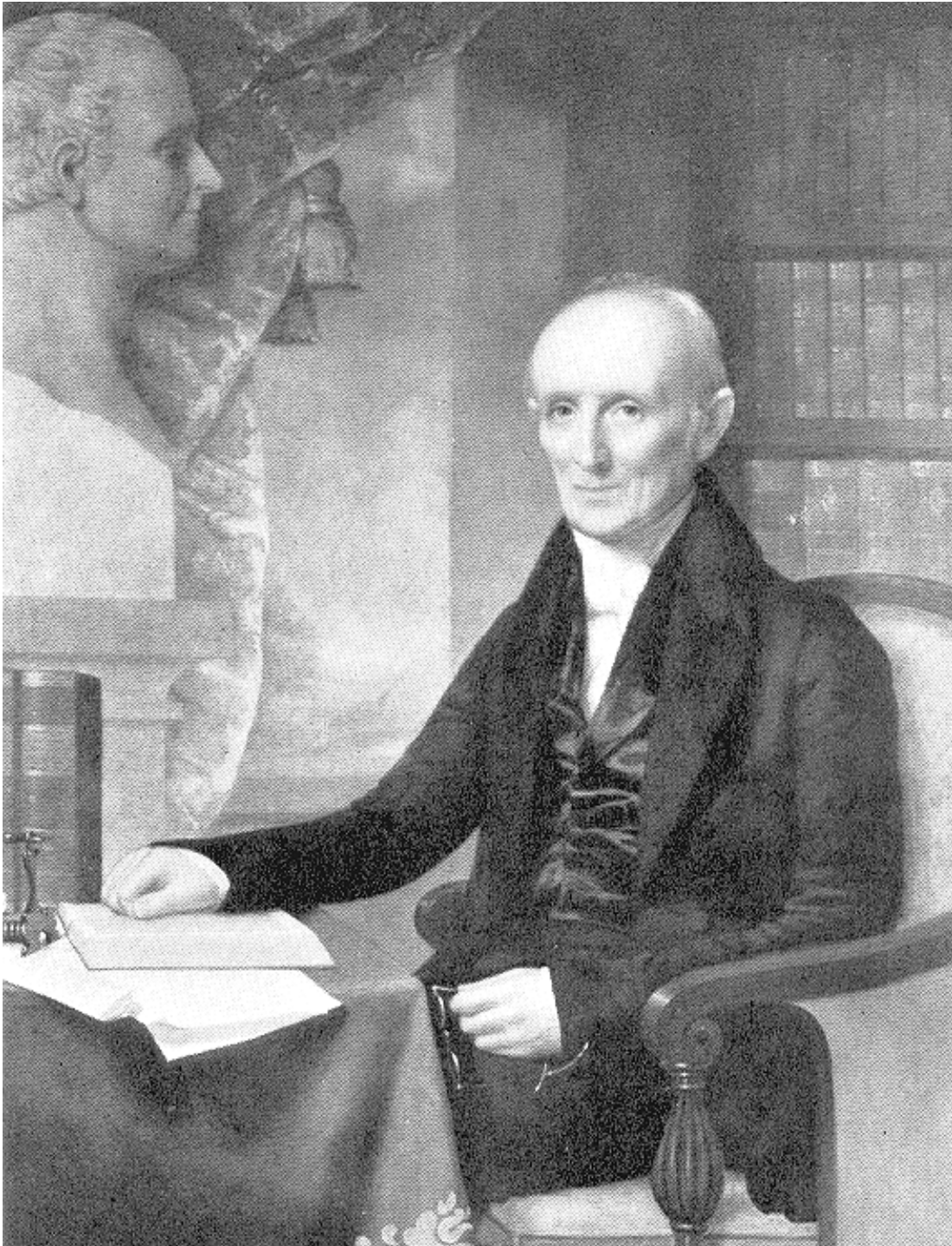


ASTRONOMY

ASTRONOMY

of the unwonted light, through whose gradations the full brilliancy of the day was restored, must have been very similar to those by which it had been lost, but they were little noted. I remember, however, marking the instant when I could first distinguish the blades of grass at my feet – and later again watching the shadows of the leaves on the gravel walk. The white lilies in my mother's flower-garden were observed by others among the first objects of the vegetation which could be distinguished from the windows of the house. Every living creature was soon rejoicing again in the blessed restoration of light after that frightful moment of a night at noon-day. Men who witness any extraordinary spectacle together, are apt, in after-times, to find a pleasure in conversing on its impressions. But I do not remember to have ever heard a single being freely communicative on the subject of his individual feelings at the most solemn moment of the eclipse. It would seem as if sensations were aroused too closely connected with the constitution of the spirit to be irreverently and familiarly discussed. I shall only say that I have passed a varied and eventful life, that it has been my fortune to see earth, heavens, ocean, and man in most of their aspects; but never have I beheld any spectacle which so plainly manifested the majesty of the Creator, or so forcibly taught the lesson of humility to man as a total eclipse of the sun.

Date	Greatest Eclipse		Saros		Eclipse		Sun Path		Center	
	Eclipse	Type	#	Gamma	Mag.	Lat.	Long.	Alt	Width	Dur.
1806 Jun 16	16:24	T	124	0.320	1.060	42.2N	64.5W	71	210	04m55s



Henry C. Wright’s autobiography

When quite young, there was a total eclipse of the sun in June.



That event made a deep impression on me. I heard much about it for weeks beforehand. I knew not what it was to be like, except that it was to be dark about mid-day. I was hoeing Indian corn, with two older brothers. They sent me off on an errand, and as I passed to the place, I could see the woods becoming dingy. I started to return, and by this time, birds and beasts began to be in extraordinary excitement, rushing to the roost and the lair. The woods became dark and gloomy. I was in the midst, and night seemed to drop down upon the scene in the midst of daylight. The forest had the same gloomy appearance which it had at night. The sun had an appearance I never saw before; it seemed to be in a process of going out, till, for a moment, it was all gone. I knew where I was, and the way out of the wood, and what was the matter, and had no fear. I stood still in the woods, and contemplated the scene with wonder. It soon passed, and I went on my way; but an awe was on my spirit long afterwards, whenever I saw the heavens by day or night.



June 16, Monday: There is one reliably datable event, in [Austin Steward](#)'s later account of his life as a teenage [slave](#) in upstate New York, and that date is the great [eclipse](#) that occurred on this day. We will therefore need to insert here—for lack of a better position at which to place this material in the general chronology—his autobiographical reminiscences of this period of his life:

Capt. Helm finally concluded to sell his plantation and stock, except the slaves, and remove to the Genesee Country, where he designed to locate his future residence.

The plantation and stock (retaining the slaves) were advertised for sale, and on a certain day named, all would be disposed of at a public sale, or to the highest bidder.

When the day of sale arrived, there flocked from all parts of the surrounding country the largest assemblage of people I ever saw in that place. A large number of wealthy and respectable planters were present, whose gentlemanly behavior should have been an example to others.

The majority of that vast crowd, however, were a rough, quarrelsome, fighting set, just such as might be expected from slave-holding districts. There were several regularly fought battles during the first day of the sale.

One Thomas Ford, a large, muscular, ferocious-looking fellow, a good specimen of a southern bully and woman-whipper, had been victorious through the day in numerous fights and brawls; but he had to pay dear for it when night came. Some one or more of the vanquished party, took advantage of the dark night to stab him in both sides. The knife of the assassin had been thrust into his thigh, tearing the flesh upward, leaving a frightful and dangerous wound; but what is most singular, both sides were wounded in nearly the same manner, and at the same time, for so quickly was the deed committed that the offenders made their escape, before an alarm could be raised for their detection; nor have I ever heard of any one being arrested for the crime.

Ford's groans and cries were painful to hear, but his brother acted like a madman; rushing hither and thither, with a heavy bludgeon in his hand, with which he indiscriminately beat the fences and whatever came in his way, crying "Oh my brother, my poor brother! Who has murdered my poor brother?"



Physicians came to the aid of the wounded man who at first thought he might recover, but in a climate like that of Virginia it was impossible. His friends did all they could to save him, but the poor wretch lingered a few days and died. Thus ended the life of a bad man and a hard master.

... The sale continued for several days, during which there was no such thing as rest or sleep or one quiet moment on the premises. As was customary in that State, Capt. Helm provided the food and drink for all who came, and of course a great many came to drink and revel and not to buy; and that class generally took the night time for their hideous outbreaks, when the more respectable class had retired to their beds or to their homes. And many foul deeds and cruel outrages were committed; nor could the perpetrators be detected or brought to justice. Nothing could be done but to submit quietly to their depredations.

One peaceable old slave was killed by having his head split open with an ax. He was found in the morning lying in the yard, with the bloody instrument of death by his side. This occasioned some excitement among the slaves, but as the white people paid but little attention to it, it soon passed off, and the sorrowful slaves put the old man's remains in a rough box, and conveyed them to their last resting-place.

After the sale was over, the slaves were allowed a holiday, with permission to go and visit their friends and relatives previous to their departure for their new home in a strange land.

The slaves generally on Capt. Helm's plantation looked upon this removal as the greatest hardship they had ever met; the severest trial they had ever endured; and the separation from our old home and fellow-slaves, from our relatives and the old State of Virginia, was to us a contemplation of sorrowful interest. Those who remained, thought us the most unfortunate of human beings to be taken away off into the State of New York, and, as they believed, beyond the bounds of civilization, where we should in all probability be destroyed by wild beasts, devoured by cannibals, or scalped by the Indians. We never expected to meet again in this life, hence our parting interviews were as solemn as though we were committing our friends to the grave. But He whose tender mercies are over all his creatures, knew best what was for our good.

Little did Capt. Helm think when bringing his slaves to New York that in a few short years, they would be singing the song of deliverance from Slavery's thralldom; and as little thought he of the great and painful change, to be brought about in his own circumstances. Could any one have looked into futurity and traced the difficult path, my master was to tread, – could any one have foreseen the end to which he must soon come, and related it to him in the days of his greatness and prosperity, he would, I am certain, have turned from such a narrator of misfortune in a greater rage than did Namaan when the man of God told him "to go and dip seven times in the Jordan."

He could not have believed, nor could I, that in a few years the powerful, wealthy slaveholder, living in luxury and extravagance, would be so reduced that the **necessaries** of life even, were beyond his means, and that he must be supported by the town!

But I anticipate. Let us return to the old plantation which seems



dearer than ever, now that we are about to leave it forever. We thought Capt. Helm's prospects pretty fair, and yet we shuddered when we realized our condition as slaves. This change in our circumstances was calculated to awaken all our fears that had been slumbering, and bring all the perilous changes to which we might be subjected most vividly to mind.

We were about to leave the land of our birth, the home of our childhood, and we felt that untried scenes were before us. We were slaves, it is true, but we had heart-felt emotions to suppress, when we thought of leaving all that was so familiar to us, and chose rather to "bear the ills we had, than to fly to those we knew not of." And oh, the terrible uncertainty of the future, that ever rests on the slave, even the most favored, was now felt with a crushing weight. To-day, they are in the old familiar cabin surrounded by their family, relatives and friends; to-morrow, they may be scattered, parted forever. The master's circumstances, not their own, may have assigned one to the dreadful slave-pen, and another to the distant rice-swamp; and it is this continual dread of some perilous future that holds in check every joyous emotion, every lofty aspiration, of the most favored slave at the South. They know that their owners indulge in high living, and they are well aware also that their continual indulgences engender disease, which make them very liable to sudden death; or their master may be killed in a duel, or at a horse-race, or in a drunken brawl; then his creditors are active in looking after the estate; and next, the blow of the auctioneer's hammer separates them perhaps for life.

... After the sale of the plantation, Capt. Helm was in possession of quite a large sum of money, and having never paid much attention to his pecuniary interests, he acted as if there could be no end of it. He realized about forty thousand dollars from the sale of his estate in Virginia, which would have been a pretty sum in the hands of a man who had been accustomed to look after his own interests; but under the management of one who had all his life lived and prospered on the unrequited toil of slaves, it was of little account. He bought largely of every thing he thought necessary for himself or the comfort of his family, for which he always paid the most extravagant prices. The Captain was not as well qualified to take care of himself and family as some of his slaves were; but he thought differently, and so the preparations for leaving the old plantation for a home in the wilds of New York, went on under his direction, and at last we bade a final adieu to our friends and all we held dear in the State of Virginia.

All things having been prepared for our departure, our last "Good-bye" spoken, and our last look taken of the old plantation, we started, amid the sobs and prolonged cries of separating families, in company with our master, the overseer and another white man named Davis, who went with us to take back the five-horse "Pennsylvania team," which was provided for the conveyance of the food for the slaves, and what little baggage they might have, and also that of the overseer.

Capt. Helm had determined to leave his family until he could get his slaves settled in their future quarters, and a home provided for himself, when they were expected to join him.

We traveled northward, through Maryland, Pennsylvania, and a



portion of New York, to Sodus Bay, where we halted for some time. We made about twenty miles per day, camping out every night, and reached that place after a march of twenty days. Every morning the overseer called the roll, when every slave must answer to his or her name, felling to the ground with his cowhide, any delinquent who failed to speak out in quick time.

After the roll had been called, and our scanty breakfast eaten, we marched on again, our company presenting the appearance of some numerous caravan crossing the desert of Sahara. When we pitched our tents for the night, the slaves must immediately set about cooking not their supper only, but their breakfast, so as to be ready to start early the next morning, when the tents were struck; and we proceeded on our journey in this way to the end. At Sodus Bay there was then one small tavern, kept by a man named Sill.

The bay is ten miles in length and from a half to two miles in breadth, and makes an excellent harbor. The surrounding country then was almost an unbroken wilderness.

After Capt. Helm had rested a few days at Sodus, he went six miles up the bay and purchased a large tract of land lying on both sides of that beautiful sheet of water, and put his slaves on to clear and cultivate it. Then came the "tug of war." Neither the overseer nor the slaves had the least knowledge of **clearing** land, and that was the first thing to be done. It was useless to consult the Captain, for he knew still less about matters of that kind. To obviate this difficulty, our master bought out a Mr. Cummings, who had some cleared land on the west side of the bay. On this he put the overseer and a part of the slaves, and then hired a Mr. Herrington to take charge of the remainder. Herrington and his gang of slaves was sent to the east side to chop down the heavy timber and clear the land for cultivation, all of which had first to be learned, for we knew nothing of felling trees, and the poor slaves had rather a hard time of it. Provisions were scarce and could not be procured for cash in that section. There was no corn to be had, and we had but little left. We had no neighbors to assist us in this trying time, and we came near starvation. True, the wild, romantic region in which we were located abounded in game, — elk, deer, bear, panther, and wolves, roamed abroad through the dense forest, in great abundance, but the business of the slaves was not hunting or fishing, but clearing the land, preparatory to raising crops of grain the coming season.

At last Capt. Helm chartered a boat, and manned it to go to the mouth of the Genesee River to buy corn. They embarked under favorable auspices, but soon there came on such a tremendous storm, that the boat could no longer be managed, and the crew in despair threw themselves on the bottom of the boat to await their inevitable destruction, when one of their number, a colored man named Dunbar, sprang to the helm, and with great difficulty succeeded in running her safely into a Canadian port, where they were obliged to part with every thing in their possession to obtain the means to return to their families in Sodus, who had given them up as lost. But, to the great joy of all, they came back at last with their lives, but with nothing for the famishing slaves. Before another boat could be sent for our relief, we were reduced to the last extremity. We became so



weak we could not work, and it was difficult to drag ourselves about, as we were now obliged to do, to gather up all the old bones we could find, break them up fine and then boil them; which made a sort of broth sufficient barely to sustain life. This we drank, and merely existed, until at last, the long looked for boat returned, loaded with provision, which saved us from starvation and gave us strength to pursue our labor.

About this time two slaves who were laboring in the forest, instead of returning to their cabin as was expected, got lost, and wandered eight days in the dense forest without provision, except what they could procure from roots and the bark of trees. Great exertion was made to find them; guns were fired, horns blown, and shouts raised, but all to no purpose. Finally, we gave them up, supposing they had starved to death or had been killed by wild beasts. One of them was an elderly man, named Benjamin Bristol, and the other, Edmund Watkins, a lad of about eighteen years of age. They wandered in an easterly direction, a distance of some sixty or seventy miles, through an unbroken wilderness, vainly trying to find their way home. On the eighth day, to their inexpressible joy, they came out on the shore of Lake Ontario, near Oswego; but young Watkins was so completely exhausted that he declared himself incapable of further exertion, and begged to be left to his fate. Bristol, however, who chewed tobacco, which it was supposed kept him from sinking so low as his companion, took him on his back, and carried him home, which they reached in a famished state and reduced to skeletons. All were thankful for the preservation of their lives, and, with the best we could do for them, they soon recruited and became strong as ever.

One day, two others and myself thought we saw some animal swimming across the bay. We got a boat and went out to see what it was. After rowing for some time we came near enough to perceive it was a large bear. Those who watched us from the shore expected to see our boat upset, and all on board drowned, but it was not so to be; the bear was struck on the nose with a blow that killed him instantly, and he was hauled ashore in great triumph.

While these things were transpiring on the east side of the bay, the overseer on the west side determined to punish one of the slaves who worked on the east side. The name of the slave was Williams; a strong, athletic man, and generally a good workman, but he had unfortunately offended the overseer, for which nothing could appease his wrath but the privilege of flogging him. The slave, however, thought as he was no longer in Virginia, he would not submit to such chastisement, and the overseer was obliged to content himself with threatening what he would do if he caught him on the west side of the bay.

A short time after, the overseer called at the cabin of one of the slaves, and was not a little surprised to find there the refractory slave, Williams, in company with three other men. He immediately walked up to him and asked him some question, to which Williams made no reply. Attended, as he always was, by his ferocious bull-dog, he flourished his cowhide in great wrath and demanded an instant reply, but he received none, whereupon he struck the slave a blow with the cowhide. Instantly Williams sprang and caught him by the throat and held him writhing in his



wise-like grasp, until he succeeded in getting possession of the cowhide, with which he gave the overseer such a flogging as slaves seldom get. Williams was seized at once by the dog who endeavored to defend his brutal master, but the other slaves came to the rescue, and threw the dog into a huge fire which was near by, from which, after a singeing, he ran off, howling worse than his master when in the hands of Williams. He foamed and swore and still the blows descended; then he commanded the slaves to assist him, but as none obeyed, he commenced begging in the most humble manner, and at last entreated them as "gentlemen" to spare him; but all to no purpose. When Williams thought he had thrashed him sufficiently, he let him go and hurried to his boat and rowed down the bay, instead of crossing it. The overseer no sooner found himself at liberty than he ran out, calling to a servant girl to bring his rifle, which was loaded. The rifle was brought, but before he could get to the bay, Williams had gone beyond his reach; but unfortunately another boat was at this moment crossing the bay, which he, mad with rage, fired into. The men in the boat immediately cried out to him not to repeat the shot, but he was so angry that he swore he would shoot somebody, and sent another bullet after them. No one was hurt, however, but the brave overseer was vanquished. Crest-fallen and unrevenged, he shortly after called on Capt. Helm for a settlement, which was granted, and bidding a final adieu to the "Genesee Country," he departed for Virginia, where he could beat slaves without himself receiving a cow-hiding. No one regretted his absence, nor do I think any but the most heartless would cordially welcome his return to the land of Slavery.

Capt. Helm went to Virginia for his family, and returning with them, concluded to locate his future residence in the village of Bath, Steuben County. He purchased a large tract of land near the village, a large grist mill, and two saw mills; also, two farms; one called the "Maringo," east of the village; and the other, called "Epsam," north of it; and a fine house and lot in the village. He also kept a distillery, which in those days was well patronized, for nearly every body drank whisky; and with Capt. Helm it was a favorite beverage.

The slaves were removed to Bath, where our master was well suited, and was everywhere noted for his hospitality. He had a great deal of land to cultivate, and carried on a multiplicity of business.

Soon after we were settled at Bath, Capt. Helm's eldest daughter, Jenny, was married to Mr. John Fitzhugh, her cousin, who had come from Virginia to claim his bride.

The wedding was a splendid affair. No pains were spared to make it more imposing than any thing that had ever happened in that country. Never before had the quiet village of Bath seen such splendor. All that wealth, power and ambition could do, was done to make the event one of great brilliancy. Europe contributed her full proportion; Turkey, the Indias, East and West, were heavily taxed to produce their finest fabrics to adorn the bride and bridal guests; and contribute delicacies to add elegance to the festal scene. Two days previous to the wedding, the invited guests began to arrive with their retinue of servants, and on the evening of the marriage the large mansion was thrown open,



and there was the most magnificent assemblage I ever beheld. In the drawing-room, where the ceremony took place, every thing was surpassingly elegant. Costly chandeliers shed their light on the rich tapestry, and beautiful dresses glittering with diamonds, and the large mirrors everywhere reflecting the gay concourse. While the servants were preparing supper it was announced that the hour had arrived for the ceremony to commence. The bridal pair took their place in the center of the apartment. Pearls, diamonds, and jewelry glittered on the bride with such luster, that it was almost painful to the eye to look upon her. The minister, after asking God to bless the assembled guests, and those he was about to unite in the holy bonds of wedlock, proceeded in a very solemn and impressive manner with the marriage service. The ceremony concluded, and good wishes having been expressed over the sparkling wine, the man of God took his leave, two hundred dollars richer than when he came. The company were all very happy, or appeared so; mirth reigned supreme, and every countenance wore a smile. They were seated at tables loaded with luxuries of every description, and while partaking, a band of music enlivened the scene.

All business was suspended for several days, the wedding party making a tour of ten days to [Niagara Falls](#). After a while, however, affairs assumed their usual aspect, and business took its regular routine.

The grist mill belonging to the Captain was the only one for many miles around, and was a source of great profit to him; the saw mills also, were turning out a large quantity of lumber, which was in good demand; and the distillery kept up a **steaming** business. It yielded, however, a handsome income to Capt. Helm, who was now, for the first time since I knew him, overseeing his affairs himself, dispensing altogether with the service of a regularly installed overseer.

The oldest son of our master had been absent from home for sometime, nor did he return to attend his sister's grand wedding. He had sought and obtained a commission in the United States service as a Lieutenant. This had been his own choice; he had preferred the service and hardships of a soldier, to a plantation well stocked with slaves, and the quietude of domestic life. He had cheerfully given up his friends and prospects as a planter, and entered the service of his country. Frank Helm, the second son, soon followed the example of his older brother, Lina. He obtained a like commission, but he did not, like his brother, get along quietly. His prospects as an officer were soon blighted, and all hope of being serviceable to his country vanished forever.

Lina Helm was an easy, good-natured, clever fellow; but his brother Frank was his opposite in nearly every thing; proud, fractious and unyielding. As might be expected, Frank, soon after entering the army, got into an "affair of honor," according to the duelist's code of laws. He was not, however, the principal in the difficulty. One of his friends and a brother officer, had a quarrel with a gentleman whom he challenged to mortal combat. Frank was the bearer of his friend's challenge, and on presenting it, the gentleman refused to accept it, saying that the challenger "was no gentleman." Then, according to the rules of dueling, no alternative was left for Frank, but to take



his brother officer's place, and fight. This he did and came from the bloody field disabled for life. In consequence of his lameness, he was under the necessity of resigning his commission in the army, which he did, and came home a cripple, and nearly unfitted for any kind of business whatever....

After the return of the wedding party, Mr. Fitzhugh purchased a tract of land near that of Capt. Helm, on which the newly-married couple commenced keeping house. They, however, became dissatisfied with their location, and soon after sold their possessions and returned to the South.

Capt. Helm still continued to take the oversight of his slaves, and was out every day, superintending his business, just as his overseer used to do.

About this time a man named Henry Tower came to Bath to hire "slave boys," as we were called. The Captain hired to him Simon and myself, and a Mr. Baker also hired to him one slave named Vol. McKenzie. We three started for Dresden, Ontario County, where we arrived in due time.

Mr. Tower had just bought a tract of land, three miles this side of the village of Lyons, on the Canandaigua outlet. Here Mr. Tower contemplated making great improvements, building mills, opening stores &c. This tract of land was comparatively wild, there being but a small frame house for a dwelling, one for a store, and another for a blacksmith shop. Mr. Tower had two brothers; James, the eldest, who took charge of the store, and John, the younger, who took charge of the hands who worked on the farm; Henry himself superintending the building of the mills. This firm had a great number of men in their employ that year. I was kept busy helping the women about the cooking and house-work. And here, for the first time in my life, I had a comfortable bed to sleep on, and plenty of wholesome food to eat; which was something both new and strange to me.

The Towers were thorough-going business-men; they built a large grist mill, with four run of stone, and also a distillery. In those days it was customary for nearly all classes to drink spirituous liquors; hence, the distilleries were sources of great pecuniary interest to those who owned them. But having lived to see the dreadful evils which the drinking of alcoholic beverages have produced on community, I can hardly speak of distilleries in the favorable light in which they were then regarded.

The Towers, with commendable enterprise, cleared a great number of acres of land during the first year I lived with them, besides doing a heavy business in the mill, store and distillery.

It was customary then for men to assemble at some public place for the purpose of drinking whisky and racing horses.

One Saturday afternoon there was to be a race, and all was excitement. Being young, I wished to go with the rest. I hurried through my work as fast as possible, and then, with a trembling heart, set off in search of my master, fearing lest he would refuse me the simple request. But he happened to be in uncommon good humor, and readily gave his consent; and away I went, "as happy as a lark." When I reached the race-ground, they were just preparing to run the horses. Seeing me, they knew me to be a poor friendless little slave boy, helpless and unprotected, and they could therefore do with me as they pleased, and have some



fine sport at my expense.

When I was asked to ride one of the fast horses, I felt proud of the honor conferred, and was assisted to mount, feeling highly elated with the lofty position I had gained.

The word "go," was shouted, and the horse whirled off, and it seemed to me as if he flew with the speed of lightning. My hat fell off the first thing; and there I was, clinging with might and main to the neck of the fiery animal, my head bare, my feet bootless, and my old stripped shirt blown from my back, and streaming out behind, and fluttering like a banner in the breeze; my ragged pants off at the knees, and my long legs dangling down some length below; and at the same time crying "Whoa! whoa!" as loud as I could. Nor was this all; frightened as I was, nearly to death, I cast a despairing look behind me, and the loud, derisive laugh of the bystanders rung in my ears. Ludicrous as I must have appeared, this was too much, — I felt a giddiness coming over me, my brain reeled, my hold relaxed, and the next instant I had fallen to the ground, where all consciousness left me. When I came to my senses I was lying in bed, surrounded by all the appurtenances of a dying person.

The first thing I heard was Mr. Tower scolding the men who put me on the horse, and threatening them with a law-suit for presuming to do such a thing without his permission. Mr. Tower considered himself holden to Capt. Helm for my safe return, and was therefore justly indignant at their placing my life in such peril. It was indeed a narrow escape, for the horse was running with all his speed when I fell. My bones were unbroken, however, and I suppose it must have been the tremendous jar I got when I fell that rendered me unconscious; nor do I think it impossible that the fright may not have contributed somewhat to the catastrophe.

... I continued to live with the Towers; and in the fall of that year, I had the misfortune to cut my foot badly. While chopping fire wood at the door, I accidentally struck my ax against a post, which glanced the blow in such a manner that it came down with sufficient force to nearly sever my great toe from my left foot, gashing upward completely through the large joint, which made a terrible wound. Dr. Taylor was immediately called, and sewed the flesh together, taking two stitches on the upper, and one on the under, side of the foot, before it began to swell; but when the swelling came on, the stitches on the upper side gave way, which occasioned the toe to fall over so much, that I have been slightly lame from that day to this. For several weeks I was unable to be moved, and was regularly attended by Dr. Taylor, but as soon as it could be done without danger, I was taken back to Capt. Helm's, where I found things in much the same condition as when I left them over a year before.

... I managed to purchase a spelling book, and set about teaching myself to read, as best I could. Every spare moment I could find was devoted to that employment, and when about my work I could catch now and then a stolen glance at my book, just to refresh my memory with the simple lesson I was trying to learn. But here Slavery showed its cloven foot in all its hideous deformity. It finally reached the ears of my master that I was learning to read; and then, if he saw me with a book or a paper in my hand, oh, how he would swear at me, sending me off in a hurry, about



some employment. Still I persevered, but was more careful about being seen making any attempt to learn to read. At last, however, I was discovered, and had to pay the penalty of my determination. I had been set to work in the sugar bush, and I took my spelling book with me. When a spare moment occurred I sat down to study, and so absorbed was I in the attempt to blunder through my lesson, that I did not hear the Captain's son-in-law coming until he was fairly upon me. He sprang forward, caught my poor old spelling book, and threw it into the fire, where it was burned to ashes; and then came my turn. He gave me first a severe flogging, and then swore if he ever caught me with another book, he would "whip every inch of skin off my back," &c.

... About this time Capt. Helm began to sell off his slaves to different persons, as he could find opportunity, and sometimes at a great sacrifice. It became apparent that the Captain, instead of prospering in business, was getting poorer every day. ... I was one afternoon at a neighbor's house in the village, when I was suddenly taken so violently ill with pain in my head and side, that I had to be carried home. When we arrived there, I was allowed a pallet of straw to lie on, which was better than nothing. Day after day, my disease increased in violence, and my master employed a physician to attend me through my illness, which brought me very low indeed. I was constantly burning with fever, and so thirsty that I knew not what I would have given for a draught of cold water, which was denied me by the physician's direction. I daily grew weaker until I was reduced to helplessness, and was little else than "skin and bones." I really thought my time had come to die; and when I had strength to talk, I tried to arrange the few little business affairs I had, and give my father direction concerning them. And then I began to examine my own condition before God, and to determine how the case stood between Him and my poor soul. And "there was the rub." I had often excused myself, for frequent derelictions in duty, and often wild and passionate outbreaks, on account of the hardness of my lot, and the injustice with which I was treated, even in my best endeavors to do as well as I knew how. But now, with death staring me in the face, I could see that though I was a friendless "slave-boy," I had **not** always done as well as I knew how; that I had **not** served God as I knew I ought, nor had I always set a good example before my fellow-slaves, nor warned them as well as I might, "to flee the wrath to come." Then I prayed my Heavenly Father to spare me a little longer, that I might serve Him better; and in His mercy and gracious goodness, He did so; though when the fever was turning they gave me up; and I could hear them say, when they came to feel my pulse, "he is almost gone," "it will soon be over," &c., and then inquire if I knew them. I did, but was too weak to say so. I recollect with gratitude, the kindness of Mrs. H.A. Townsend, who sent me many delicacies and cooling drinks to soften the rigor of my disease; and though I suppose she has long since "passed away" and gone to her reward, may the blessing of those who are ready to perish, rest upon the descendants of that excellent woman.

Capt. Helm was driving on in his milling, distillery and farming business. He now began to see the necessity of treating his slaves better by far than he had ever done before, and granted



them greater privileges than he would have dared to do at the South. Many of the slaves he had sold, were getting their liberty and doing well.

While I was staying with my master at Bath, he having little necessity for my services, hired me out to a man by the name of Joseph Robinson, for the purpose of learning me to drive a team. Robinson lived about three miles from the village of Bath, on a small farm, and was not only a poor man but a very mean one. He was cross and heartless in his family, as well as tyrannical and cruel to those in his employ; and having hired me as a "slave boy," he appeared to feel at full liberty to wreak his brutal passion on me at any time, whether I deserved rebuke or not; nor did his terrible outbreaks of anger vent themselves in oaths, curses and threatenings only, but he would frequently draw from the cart-tongue a heavy iron pin, and beat me over the head with it, so unmercifully that he frequently sent the blood flowing over my scanty apparel, and from that to the ground, before he could feel satisfied.

These kind of beatings were not only excessively painful, but they always reminded me of the blows I had so often received from the key, in the hand of Mrs. Helm, when I was but a little waiter lad; and in truth I must say that the effect of these heavy blows on the head, have followed me thus far through life; subjecting me to frequent and violent head-aches, from which I never expect to be entirely free. Even to this day I shudder at the thought, when I think how Robinson used to fly at me, swearing, foaming, and seeming to think there was no weapon too large or too heavy to strike me with.

He and I were at one time logging with a yoke of oxen, which it was my business to drive. At that time rattle-snakes were numerous, and a great terror to the inhabitants. To be bitten by one of these poisonous reptiles was certain and almost instant death; hence, the greatest caution and constant vigilance was necessary to avoid them while at work. I had been sent with the oxen to draw a log to the pile, and when I came up to it, I observed that it appeared to be hollow; but stepping forward, with the chain in my hand, ready to attach it to the log, when, oh, horror! the warning rattle of a snake sounded like a death knell in my ears, proceeding from the log I was about to lay hold of. I was so much frightened by the sound, that I dropped the chain as though it were red hot, left my team, and ran with all the speed in my power, screaming "murder, murder!" as loud as I could.

This proceeding, which was the fearful impulse of the moment, offended Robinson, and gave him another opportunity to beat me most cruelly. He was himself as much afraid of rattle-snakes as I; but he was the master and I the "slave boy," which made a vast difference. He caught hold of me, and, with horrid oaths, beat me with his fist again and again; threatening me with awful punishment if I did not instantly return and bring the log to the desired spot. I never can forget the mortal agony I was in, while compelled by his kicks and blows to return and fasten the chain around the log containing the deadly serpent. I, however, succeeded with trembling hands, and drove the oxen, but keeping myself at the farthest possible distance from them and the log. When I finally arrived at the pile, Mr. Robinson and some



other men, cut a hole with an ax in the log, and killed the large, venomous rattle-snake that had occasioned me so much alarm and such a cruel beating. Nor was the uncontrollable and brutal passion of Robinson his only deficiency; he was mean as he was brutal.

He had, at one time, borrowed a wagon of a neighbor living two miles distant, through a dense forest. On the day of the total eclipse of the sun, it entered his head that it would be fine sport, knowing my ignorance and superstition, to send me, just as the darkness was coming on, to return the borrowed wagon. I accordingly hitched the ox-team to it and started. As I proceeded through the wood, I saw, with astonishment and some alarm, that it was growing very dark, and thought it singular at that hour of the day. When I reached the place of my destination it was almost total darkness, and some persons, ignorant as myself, were running about, wringing their hands, and declaring that they believed the Day of Judgment had come, and such like expressions.

The effect of all this was, however, very different from what my master had expected. I thought, of course, if the judgment day had come, I should be no longer a slave in the power of a heartless tyrant. I recollect well of thinking, that if indeed all things earthly were coming to an end, I should be free from Robinson's brutal force, and as to meeting my Creator, I felt far less dread of that than of meeting my cross, unmerciful master. I felt that, sinful as I had been, and unworthy as I was, I should be far better off than I then was; driven to labor all day, without compensation; half starved and poorly clad, and above all, subjected to the whims and caprices of any heartless tyrant to whom my master might give the power to rule over me. But I had not much time for reflection, I hurried home; my mind filled with the calm anticipation that the end of all things was at hand; which greatly disappointed my expectant master, who was looking for me to return in a great fright, making some very ludicrous demonstration of fear and alarm. But after a few months more of hardship I was permitted to return to Capt. Helm's, where I was treated much better than at Robinson's, and much, better than the Captain used to treat his slaves.

Capt. Helm, not having demand for slave labor as much as formerly, was in the practice of hiring out his slaves to different persons, both in and out of the village; and among others, my only sister was hired out to a **professed** gentleman living in Bath. She had become the mother of two or three children, and was considered a good servant.

One pleasant Sabbath morning, as I was passing the house where she lived, on my way to the Presbyterian church, where I was sent to ring the bell as usual, I heard the most piteous cries and earnest pleadings issuing from the dwelling. To my horror and the astonishment of those with me, my poor sister made her appearance, weeping bitterly, and followed by her inhuman master, who was polluting the air of that clear Sabbath morning, with the most horrid imprecations and threatenings, and at the same time flourishing a large raw-hide. Very soon his bottled wrath burst forth, and the blows, aimed with all his strength, descended upon the unprotected head, shoulders and back of the helpless woman, until she was literally cut to pieces. She



writhed in his powerful grasp, while shriek after shriek died away in heart-rending moanings; and yet the inhuman demon continued to beat her, though her pleading cries had ceased, until obliged to desist from the exhaustion of his own strength. What a spectacle was that, for the sight of a brother? The God of heaven only knows the conflict of feeling I then endured; He alone witnessed the tumult of my heart, at this outrage of manhood and kindred affection. God knows that my will was good enough to have wrung his neck; or to have drained from his heartless system its last drop of blood! And yet I was obliged to turn a deaf ear to her cries for assistance, which to this day ring in my ears. Strong and athletic as I was, no hand of mine could be raised in her defence, but at the peril of both our lives; – nor could her husband, had he been a witness of the scene, be allowed any thing more than unresisting submission to any cruelty, any indignity which the master saw fit to inflict on **his wife**, but the other's **slave**.

Does any indignant reader feel that I was wanting in courage or brotherly affection, and say that he would have interfered, and, at all hazards, rescued his sister from the power of her master; let him remember that he is a **freeman**; that he has not from his infancy been taught to cower beneath the white man's frown, and bow at his bidding, or suffer all the rigor of the slave laws. Had the gentlemanly woman-whipper been seen beating his horse, or his ox, in the manner he beat my poor sister, and that too for no fault which the law could recognize as an offence, he would have been complained of most likely; but as it was, she was but a "slave girl," – with whom the slave law allowed her master to do what he pleased.

... The Captain sold my aunt Betsy Bristol to a distinguished lawyer in the village, retaining her husband, Aaron Bristol, in his own employ; and two of her children he sold to another legal gentleman named Cruger. One day Captain Helm came out where the slaves were at work, and finding Aaron was not there, he fell into a great rage and swore terribly. He finally started off to a beach tree, from which he cut a stout limb, and trimmed it so as to leave a knot on the but end of the stick, or bludgeon rather, which was about two and a half feet in length. With this formidable weapon he started for Aaron's lonely cabin. When the solitary husband saw him coming he suspected that he was angry, and went forth to meet him in the street. They had no sooner met than my master seized Aaron by the collar, and taking the limb he had prepared by the smaller end, commenced beating him with it, over the head and face, and struck him some thirty or more terrible blows in quick succession; after which Aaron begged to know for what he was so unmercifully flogged.

"Because you deserve it," was the angry reply. Aaron said that he had ever endeavored to discharge his duty, and had done so to the best of his ability; and that he thought it very hard to be treated in that manner for no offence at all. Capt. Helm was astonished at his audacity; but the reader will perceive that the slaves were not blind to the political condition of the country, and were beginning to feel that they had some rights, and meant to claim them.

Poor Aaron's face and head, however, was left in a pitiable condition after such a pummeling with a knotty stick. His face,



covered with blood, was so swollen that he could hardly see for some time; but what of that? Did he not belong to Capt. Helm, soul and body; and if his brutal owner chose to destroy his own property, certainly had he not a right to do so, without let or hindrance? Of course; such is the power that Slavery gives one human being over another.

And yet it must be confessed that among the poor, degraded and ignorant slaves there exists a foolish pride, which loves to boast of their master's wealth and influence. A white person, too poor to own slaves, is as often looked upon with as much disdain by the miserable slave as by his wealthy owner. This disposition seems to be instilled into the mind of every slave at the South, and indeed, I have heard slaves object to being sent in very small companies to labor in the field, lest that some passer-by should think that they belonged to a poor man, who was unable to keep a large gang. Nor is this ridiculous sentiment maintained by the slaves only; the rich planter feels such a contempt for all white persons without slaves, that he does not want them for his neighbors. I know of many instances where such persons have been under the necessity of buying or hiring slaves, just to preserve their reputation and keep up appearances; and even among a class of people who profess to be opposed to Slavery, have I known instances of the same kind, and have heard them apologize for their conduct by saying that "when in Rome, we must do as the Romans do."

Uncle Aaron Bristol was one of Capt. Helm's slaves who had a large amount of this miserable pride; and for him to be associated with a white man in the same humble occupation, seemed to give him ideas of great superiority, and full liberty to treat him with all the scorn and sarcasm he was capable of, in which my uncle was by no means deficient.

At this time the Captain owned a fine and valuable horse, by the name of *Speculator*. This horse, groomed by uncle Aaron, stood sometimes at Bath and sometimes at Geneva; and at the latter village another horse was kept, groomed by a white man. The white groom was not very well pleased with Aaron's continual disparagement of the clumsy animal which my uncle called "a great, awkward plow-horse;" and then he would fling out some of his proud nonsense about "**poor white people** who were obliged to groom their own old dumpy horses," &c.

Well, things went on in this unpleasant manner for several weeks, when at last the white groom and Aaron met at Geneva, and the horse belonging to the former, designedly or accidentally, escaped from his keeper, and came with full speed, with his mouth wide open, after *Speculator*. When the fiery fellow had overtaken uncle Aaron he attempted to grasp the wethers of *Speculator* with his teeth, instead of which he caught Aaron on the inside of his thigh, near the groin, from whence he bit a large piece of flesh, laying the bone entirely bare; at the same moment flinging Aaron to the ground, some rods off; and the next instant he kicked *Speculator* down a steep embankment Aaron was taken up for dead, and Dr. Henry sent for, who dressed his wounds; and after several months' confinement he finally recovered. It is probable that the biting and overthrow of Aaron saved his life, as he must have otherwise been killed in the encounter of the two horses. A while after his recovery, uncle Aaron succeeded in procuring



ASTRONOMY

ASTRONOMY

a team and some kind of vehicle, in which he put his wife and children, and between two days, took "French leave" of his master as well as of the lawyer to whom his wife belonged.

The lawyer, however, was far from being pleased when he missed his property, and immediately set his wits to work to reclaim her. All was kept secret as possible, but it was whispered about that it was to be done by a State's warrant, for removing the clothing and furniture they had taken, and so, being thus arrested, "Madam Bristol" would be glad to return to her work in the lawyer's kitchen. But Aaron was a smart, shrewd man, and kept out of their reach, where he soon found friends and employment, and could go where he pleased, without having an infuriated master to beat and disfigure him with a knotted stick, until his clothes were bespattered with blood. They appreciated their liberty, and lived and died in peace and freedom.

Capt. Helm continued his old manner of treating slaves, dealing out their weekly allowance of corn or meal; but living as we now did, so much more intimately with white inhabitants, our condition was materially improved. The slaves became more refined in manners and in possession of far greater opportunities to provide for themselves, than they had ever before enjoyed, and yet it was **Slavery**. Any reverse in the fortunes of our master would be disadvantageous to us. Oh, how this fearful uncertainty weighed upon us as we saw that our master was not prospering and increasing in wealth; but we had not the dismal fears of the loathsome slave-pen, rice swamps, and many other things we should have to fear in Virginia. We were still **slaves**, and yet we had so much greater chance to learn from the kind, intelligent people about us, so many things which we never knew before, that I think a slave-trader would have found it a difficult task to take any one of us to a Southern slave market, if our master had so ordered it.

The village of Bath is rather an out-of-the-way place, hemmed in on all sides by mountains of considerable height, leaving an opening on the north, through a pleasant valley, to the head of Crooked Lake. Produce of every kind, when once there, met a ready sale for the New York market.

In the first settlement of the country this was the only outlet for the country produce, which was transported in rude boats or vessels called **arks**, built during the winter season to await the spring freshet; then they loaded them with wheat or other produce, and sent them to Baltimore or elsewhere. They used also to obtain great quantities of fine lumber, and floated it through the same rivers every spring; but it was attended with great loss of life and property.

Bath assumed a warlike appearance during the last war with Great Britain; the public square was dotted all over with officers, marquees, and soldiers' tents. Some of these soldiers were unprincipled and reckless men, who seemed to care very little what they did.

One evening I was walking around the encampment in company with a Mr. James Morrison, a clerk in the land office, looking at the soldiers, until we came near a sentinel on duty. He kept his gun to his shoulder until we came near enough, and then he attempted to run me through with his bayonet. Young Morrison sprang



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forward, and seizing the musket, told me to run; I did so, which probably saved my life.

1807

➡ March 29, Easter Sunday: According to the records of the West Church in Boston as investigated by Judy Fichtenbaum of the Concord Museum, on this day a son, Charles Howard Lapham, was born to Mr [Luther Lapham](#) & wife ([Sophia Dunbar](#) Lapham).

CHARLES DUNBAR

Heinrich Wilhelm Olbers discovered the sole [asteroid](#) visible with the naked eye, Vesta (this was the 4th asteroid to be viewed from Earth).

ASTRONOMY

“Responses to the Litany for chorus” by Samuel Wesley was performed for the 1st time, in St. Paul’s Cathedral, London. This had been intended for last [Christmas](#) but had been postponed until Easter, today.

➡ September 19, Saturday: A great [comet](#) whipped around the sun.
Friend [Stephen Wanton Gould](#) wrote in his journal:

*7 day 19 of 9 M 1807 / The day has passed with but little benefit,
- a poor dull thing – Set part of the evening at C R’*

RELIGIOUS SOCIETY OF FRIENDS

➡ September 27, Sunday: The great [comet](#) passed by the orbit of Earth on its way back into space, displaying well-separated gas and dust tails.

In [Newport, Rhode Island](#), Friend [Stephen Wanton Gould](#) wrote in his journal:

*1 day / I[n] the mornng walked up to P L’s & found my dear H well
then to meeting where I could not get to the root as at some
times. Our friend H Almy was concerned in a zealous & I thought
favord testimony after meeting returned to P L, spent the
afternoon & evening with my dear H & lodged there- –*

RELIGIOUS SOCIETY OF FRIENDS

➡ September 28, Monday: In [Newport, Rhode Island](#), Friend [Stephen Wanton Gould](#) wrote in his journal:

*2 day / Rose early & walked home in about one Hour & three
quarters it was a pleasant walk & a very refreshing visit
Set the latter part of the evening at J Earl’s in a pleasant
circles*

RELIGIOUS SOCIETY OF FRIENDS



September 29, Tuesday: In [Newport, Rhode Island](#), Friend [Stephen Warton Gould](#) recorded having foolishly paying nine pence to view a curious piece of machinery, and how that reminded him that once he had paid to view Old Bet when she had been on tour in 1797 — and that in addition he had glimpsed the [comet](#) that was currently in the night skies:⁷¹

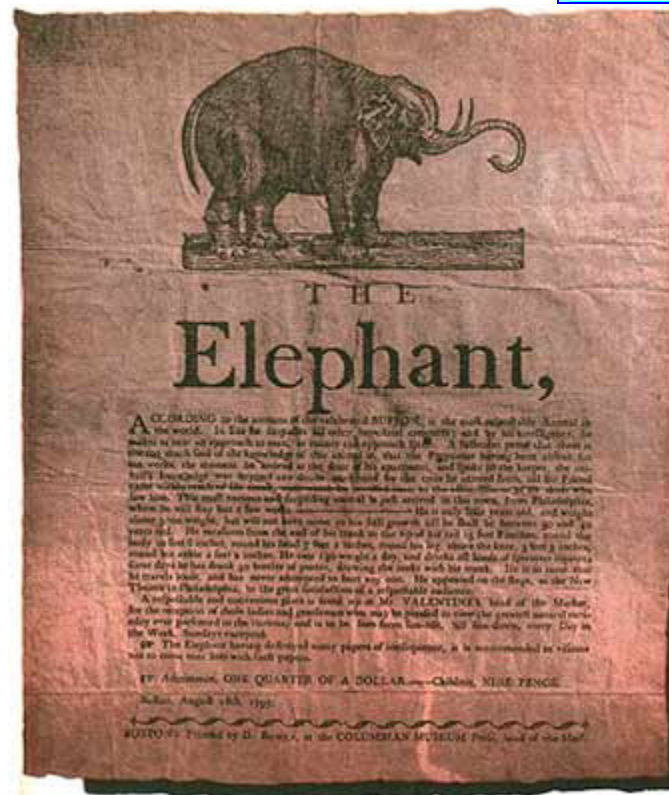
3 day 29 of 9 M / Spent nine pence foolishly, but there was some excuse for it, there is in town a thing called the house of Industry, which was represented to me as a curious peace of Machenery which I thought the line of my occupation would warrant me in visiting & to be sure it was curious to see many kinds of work all perform'd in miniture at one time by one set of works such as blacksmithing, shoemaking, a woman with her spinning wheel, sawing of wood, a woman pumping &c but "all is vanity saith the preacher" while I was standing by it I clearly felt I had no buisness there, & while I was there & before I went was inwardly reproved. I never before went to see any kind of show except - the Elephant & even then was much dissatisfied with myself for appearing at a place where so many people were - I hope this will be sufficient to teach me nore wisdom in future

In the evening viewed a Comet that for several nights has appear'd. There was nothing very remarkable in its appearance, except a Small flash like a tail, it is the first I ever saw,

71. "GREAT COMET, 1807 (1807 R1). Visible with the unaided eye from early in September until late December, T=1807 September 19. Discovered in the evening twilight of September 9 not far from the bright star Spica. Comet of 1st magnitude with a short tail, moving toward the northeast. Late in the month, 1st magnitude with a 7-8 degree tail. During the middle of October, when situated Serpens, still of 1st or 2nd magnitude and sporting two tails, the longer of which spanned 10 degrees. Crossed Hercules in the latter half of October and the first part of November, fading from 2nd to 4th magnitude but the main tail remained up to 5 degrees long. Situated near the bright star Deneb in mid December, when approaching the limit of naked eye visibility."

therefore the more of a curiosity

RELIGIOUS SOCIETY OF FRIENDS



→ October 7, Wednesday: At Philadelphia, “a comet visible.”

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

4 day 7 of 10 M / Saw the Corps of a child of JH the most singular circumstance that has come within my knowledge or the knowledge of a person present that said he had layed out more than and hundred persons - the child died on second day last & there still appears heat in it Particularly about the neck & the boody in general, has not that deathly cold which other corps have, every limb & joint moves as easy as if it was living, I saw its hand taken & put to its head - & there is no smell about it not even the common smell that allways attends corpses

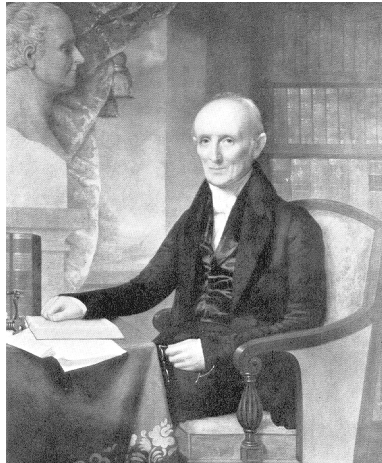
RELIGIOUS SOCIETY OF FRIENDS

ASTRONOMY

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December 14, Monday: In the early morning hours, a huge fireball streaked from north to south over New England at a speed of three miles per second and an altitude of some 18 miles, exploding with the noise of a small cannon above Weston, Connecticut. Remnants would be collected and studied by Yale College. Shown a rocky fragment that weighed nearly 200 pounds, President [Thomas Jefferson](#) remained skeptical of the supposition that stony matter might be originating anywhere else than from down here upon the surface of the earth (like extinct dinosaurs, this was something that just didn't fit into his mental universe). We owe the calculations of the speed and altitude of this [meteor](#) to Nathaniel Bowditch, who throughout his life was in constant search for instances which would succumb to the tools of mathematical analysis.



SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

*2nd day 14 of 12 M / A severe struggle between flesh & spirit.
I never more sensibly felt that truth of the assertion that there
is no temptation so great but that with the temptation there,
was, or is a way made for an escape. —*

RELIGIOUS SOCIETY OF FRIENDS

1808



In the [Bonaparte](#) governmental apparatus, [Baron Joseph-Marie de Gérando](#) was nominated “master of requests.” (Evidently this was to serve as a sort of buffer, to keep favor-seekers from forever being in the important guy's hair? — President Nixon kept a Quaker on his staff, whose function was to meet with Quaker delegations to the White House and thus keep these people away from him.)

Charles Messier authored a pamphlet agreeing with [Napoléon](#)'s attitude, that the magnificent [comet](#) he had had the honor to discover in 1769 had been a celestial sign, although at the time he had had no wit to recognize this, of the great one's birth. (Flattery will get you everywhere.)

SKY EVENT



ASTRONOMY

ASTRONOMY



May 16, Monday: A report that can only be characterized as “a UFO sighting” appeared in the Transactions of the Swedish Academy of Sciences. According to this report, it was a warm, cloudless day in Sweden, but at about 4PM the sun strangely dimmed and “there appeared on the western horizon, from where the wind blew, to arise gradually, and in quick succession, a great number of balls, or spherical bodies, to the naked eye of a size of the crown of a hat, and of a dark brown color.” As these objects drifted with the breeze in the direction of the sun, their appearance darkened until they appeared “entirely black.” Eventually most of them drifted on over the eastern horizon, but “[d]uring this course, some disappeared, others fell down.... The phenomenon lasted uninterruptedly, upwards of two hours, during which time millions of similar bodies continually rose in the west, one after the other irregularly, and continued their career in exactly the same manner. No report, noise, nor any whistling or buzzing in the air was perceived. As these balls slackened their course on passing by the Sun, several were linked together, three, six, or eight of them in a line, joined like a chain-shot by a thin and straight bar; but on continuing again a more rapid course, they separated, and each having a tail after it, apparently of three or four fathoms length, wider at its base where it adhered to the ball, and gradually decreasing, till it terminate in a fine point. During the course, these tails, which had been the same black color as the balls, disappeared by degrees.” An official of the Swedish Academy, K.G. Wettermark, reported that some of the balls came to earth in his vicinity, and that as they came down they lost their dark color, were unseen for a brief period, and then when they became visible again they were iridescent “in this particular exactly resembling those air-bubbles which children use to produce from soapsuds by means of a reed. When the spot, where such a ball had fallen, was immediately after examined, nothing was to be seen, but a scarcely perceptible film or pellicle, as thin and fine as a cobweb, which was still changing colors, but soon entirely dried up and vanished.” (Such reports were apparently rather familiar in the earlier centuries, and we have the terms “star jelly” and, in Welsh, *pwdre ser* meaning “rot from the stars.” References to such a material descending from the sky are to be noticed in a poem by Sir John Suckling from 1541 and in a poem by John Dryden from 1679. In 1712 the Reverend John Morton of Emmanuel College had obtained enough of this strange sky-falling material to burn some of it, and noted that “there was left a film like isinglass, and something like the skins and vessels of animal bodies.”).

ASTRONOMY

Friend [Stephen Wanton Gould](#) wrote in his journal:

2nd day 16th of 5 M / A day of considerable favor of mind - I have begun to read the life of the celebrated C J Fox, his dissipation is astounding, but is evidently to be traced to the unaccountably imprudent indulgences of his Father - I hope it may teach me more wisdom in the management of my children should I ever have any - in the evening at C Rs—

RELIGIOUS SOCIETY OF FRIENDS



1811



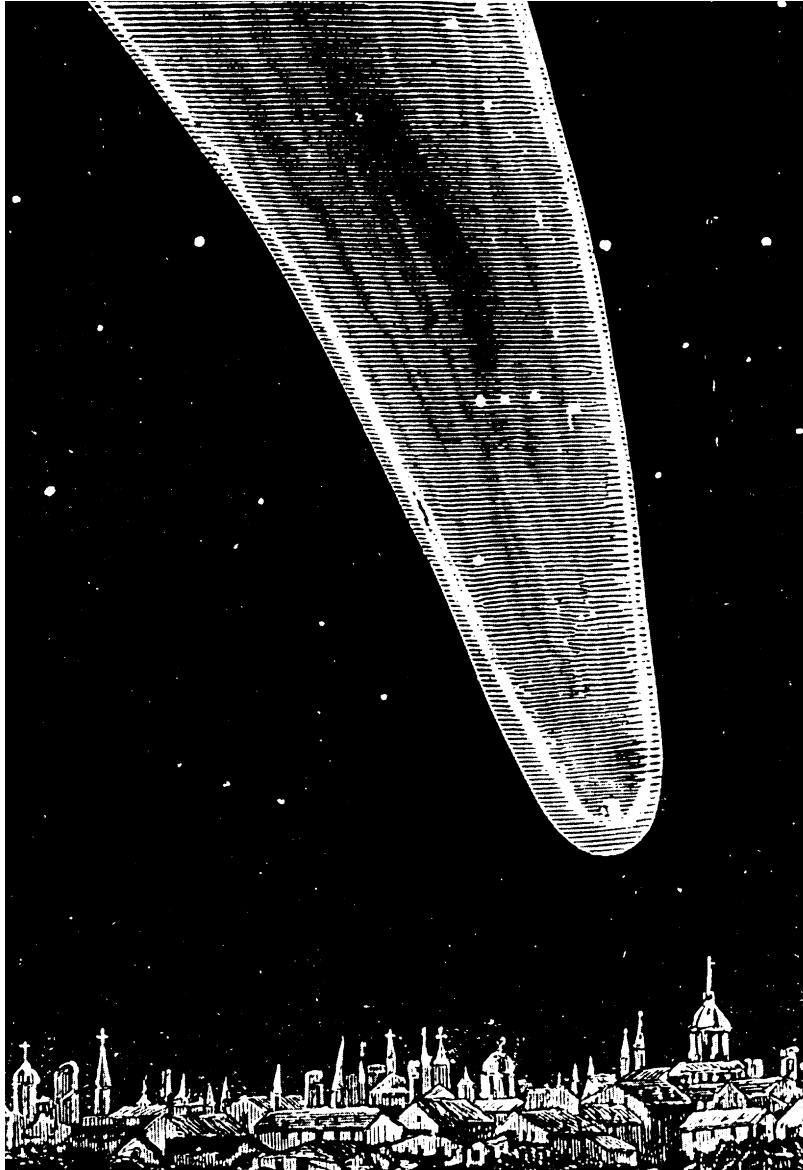
[Professor Sylvestre François Lacroix](#)'s *INTRODUCTION À LA GÉOGRAPHIE MATHÉMATIQUE ET CRITIQUE, ET À LA GÉOGRAPHIE PHYSIQUE* (Paris: J.G. Dentu, Imprimeur-Libraire, Rue du Pont de Lodi, n° 3, près le Pont-Neuf).

A spectacular [comet](#) appeared, with a tail that would extend some 100,000,000 across the heavens, a greater distance than from the sun to the earth. This comet would remain visible for a year and a half and would be very bright for many weeks. Henry Bell's steamship *The Comet*, which would go into operation on the Clyde River of Scotland in the following year, would be named after this comet. Since, in this year, Portugal would produce a very good vintage of port, this vintage would be marketed for many years as "comet wine," the unusual size of the comet being pressed into service as an explanation for the unusual excellence of the vintage. The comet would appear on the bottle labels as a maiden with streaming hair holding burning brands in her

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hands.



This, the “Great Comet of 1811,” would be given a mention by Tolstoy in WAR AND PEACE:⁷²

The radiant star which, after traveling in its orbit with inconceivable velocity through infinite space, seemed suddenly -like an arrow piercing the earth- to remain fast in one chosen spot in the black firmament, vigorously tossing up its tail.

SKY EVENT

Nine-year-old [Harriet Martineau](#) would, to her mortification, be entirely unable to make out the comet in the night sky no matter how hard she tried:

When the great comet of 1811 was attracting all eyes, my star-gazing was just as ineffectual. Night after night, the whole



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family of us went up to the long windows at the top of my father's warehouse; and the exclamations on all hands about the comet perfectly exasperated me,—because I could not see it! "Why, there it is!" "It is as big as a saucer." "It is as big as a cheese-plate." "Nonsense; you might as well pretend not to see the moon." Such were the mortifying comments on my grudging admission that I could not see the comet. And I never did see it. Such is the fact; and philosophers may make of it what they may,—remembering that I was then nine years old, and with remarkably good eyes.



March 25, Monday: [Percy Bysshe Shelley](#) had just written A POETICAL ESSAY on war according to which it was the “cold advisers of yet colder kings” who had “the power to breathe / O’er all the world the infectious blast of death”;

Millions to fight compell'd, to fight or die
In mangled heaps on War's red altar lie . . .
When legal murders swell the lists of pride;
When glory's views the titled idiot guide....
Man must assert his native rights, must say
We take from Monarchs' hand the granted sway;
Oppressive law no more shall power retain,
Peace, love, and concord, once shall rule again,
And heal the anguish of a suffering world;
Then, then shall things which now
confusedly hurled,
Seem Chaos, be resolved to order's way,
And error's night be turned to virtue's day –

72. "GREAT COMET, (C/1811 F1=1811 I). Followed without optical aid from Apr. 1811 until Jan. of 1812, T=1811 September 12. Also known as Comet Flaugergues. During April faintly visible to the unaided eye low in the evening sky in Puppis. Brightened to roughly magnitude 5 before entering the twilight. Not seen again until the third week of August when still in conjunction with the Sun but well north of it in Leo Minor. Visible at both dusk and dawn as an object of perhaps 2-3 magnitude. Moved steadily to the northeast. In mid September, of magnitude 1-2, tail a dozen degrees long. In the beginning of October, visible throughout the night from mid northern latitudes as a spectacular object situated below the handle of the Big Dipper. Comet's head about 1st magnitude with a tail spanning up to 25 degrees. Later in October traversed Bootes and Hercules as an evening object, magnitude 1-2, tail over 20 degrees long. Early in December situated near the star Altair, magnitude 3-4 with a 5 degree tail. At the opening of January 1812, when approaching the evening twilight, visible as a 5th magnitude object in Aquarius."

He and Thomas Jefferson Hogg were expelled from University College for refusing to answer questions about the authorship of THE NECESSITY OF ATHEISM.



That evening in Viviers, France, Honoré Flaugergues noticed without a [telescope](#) a [comet](#) (C/1811 F1) in the area of the sky covered by a “constellation” that we no longer use for such purposes, one then termed [Argo Navis](#).

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

2nd day 25 of 3 Mo// Nothing material thro' the day except that my H spent the Afternoon at my fathers



March 26, Tuesday evening: Honoré Flaugergues again viewed the [comet](#) (C/1811 F1) he had noticed on the previous evening, low in the south, and it was moving northward and brightening. He estimated its orbit to be RA=8h 01.7m, DEC=-29° 03' and such an orbit indicates that it was being discovered while still at the distance of the asteroid belt, 2.72 AU from the sun.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

3rd day 26 of 3 Mo// Recd this forenoon a very acceptable dated 14th in answer to mine of the 6th inst to Philip Dunham of which I was very glad - Aunts Patty, Mary, & Hannah Gould spent the day with us - & Sister Elizabeth Set the evening -

RELIGIOUS SOCIETY OF FRIENDS



March 27, Wednesday evening: Honoré Flaugergues found the [comet](#) (C/1811 F1) again, in the constellation of Puppis. He would view his comet on succeeding nights until, on the night of April 1st, the light of the waxing moon would begin to interfere with observation. The moon would reach full phase on April 8th and then it would become possible to view the comet again, on April 11th, despite the moon's waning interference.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

4th day 27 of 3rd// 1811// Richard Wilbour son of Joseph was this day committed to the dust the funeral was held at the meeting house David Buffum had a short testimony – Brother Isaac & Wife Set the evening with us also – Sister Elizabeth

RELIGIOUS SOCIETY OF FRIENDS



April 11, Thursday night: Franz Xaver von Zach of the observatory of St. Peyre near Marseille was in the process of confirming Honoré Flaugergues's discovery of a new [comet](#) (C/1811 F1). By accident, in Marseille, Jean Louis Pons, although not alerted, also noticed it.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

5th day 11th of 4th Mo// Our meeting was silent, but pretty well attended. Wm S Wall & John Burlingham attended – Aftermeeting [sic] we dined at my fathers & spent the Afternoon & evening –

RELIGIOUS SOCIETY OF FRIENDS



May 29, Wednesday evening: Honoré Flaugergues last detected the C/1811 F1 [comet](#), at 54 degrees from the sun. Naked-eye observations were difficult because of the comet's low altitude as well as because of its entrance into the twilight sky.

SKY EVENT

French troops stormed and captured Fort Olivo at Tarragona in Catalonia.

Friend [Stephen Wanton Gould](#) wrote in his journal:

4th day 29 of 5 Mo// It has again been a day wherein my mind has been very low, & depressed. I know not what to say but that it is so

RELIGIOUS SOCIETY OF FRIENDS



ASTRONOMY

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June 2, Sunday: That evening [George Gordon, Lord Byron](#) left Malta for England aboard the frigate *Volage*.

Cantata per la nascita del re di Roma by Simon Mayr to words of Muletto was performed for the initial time, in Bergamo for the benefit of the Pio Istituto Musicale. On the same day, Mayr's cantata Numa Pompilio to words of Carrara-Spinelli was performed for the initial time, in Bergamo for the christening of the King of Rome.

That evening William J. Burchell (who was in Cape Town, South Africa from late 1810 until mid-1811) wrote in his journal that many of the people there, who had recently felt an earthquake, "coupled the [comet](#), which had been seen every night since the 12th of the foregoing month, and the earthquake together, and drew from this two-fold portentous sign, the certain prognostics of the annihilation of the Cape." On this night Franz Xaver von Zach of the observatory of St. Peyre near Marseille last detected the comet at an elongation of 52 degrees.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

1st day Rose early & began to work. - at the time went to meeting, returned & dined at cousin Greenes, finished what I had to do there, & went to the Widow Weedens to rectify her clock & returned to cousin J G's & lodged - It is disagreeable to me to work on first days but it seems as if there was no other way for me to get along - It is what I disapprove of as being made an unnecessary practice of tho' when necessity requires it I can see no iniquity in it: first I was away from my shop & no one to answer to my mail in my absence, & further I was obliged to be at home, to attend the vendue of D Holloway as executor to his Will -

RELIGIOUS SOCIETY OF FRIENDS



June 11, Tuesday evening: Don Jose Joaquin de Ferrer last determined, from Havana, Cuba, the C/1811 F1 [comet](#)'s position, and would last see the comet in conjunction with the sun on June 15, by which time its elongation would have decreased to 41 degrees.

SKY EVENT

Grand Duke Karl Friedrich of Baden died and was succeeded by his grandson, Karl Ludwig Friedrich.

Friend [Stephen Wanton Gould](#) wrote in his journal:

3rd day 11 of 6 Mo// Again nothing material to insert except that I have been much engaged in various ways. -

RELIGIOUS SOCIETY OF FRIENDS



ASTRONOMY

ASTRONOMY



June 16, Sunday, in strong twilight: Alexander von Humboldt, in Paris, made the final observation of the C/1811 F1 [comet](#) before its being masked in sky glow due to its conjunction with the sun, with an elongation of 40 degrees.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

1st day 16 of 6 Mo// Our morning meeting was large, orderly & sober[?] J Green (as usual) opened the service with a short testimony, which would do no hurt & might do some good – Then E Thornton [Elisha, the educator?] in a short but sweet sweet communication – Then R Mott was very lengthy pretty sound, & a considerable degree of baptism attended – Susanna Horne concluded in Solemn Supplication – This Afternoon Our meeting was much larger than common & I think was more quiet & solid than common. J Green again opened as in the morning & after a long space of silence R Mott stood up & appeared to be well engaged, indeed I never heard him with more acceptance untill the two last sections of his testimony, when he advanced something relative to a future state which he nor no one else could prove & which he had better let alone, from that section his authority ceased in my opinion & in the opinion of may others – Aged Mehitable Jenkins concluded the meeting with a devotional prayer, & I believe the weight & purity of her offering was generally felt over the meeting, tho' perhaps not generally understood from the feebleness of her voice & brokenness of delivery – Abijah Purinton & Wife & Easter Newhall & Daniel Johnson have become our company

RELIGIOUS SOCIETY OF FRIENDS



June 25, Tuesday: The Earth's steady motion away from the [comet](#) culminated when their distances had increased to a maximum of 2.4142 AU. Thereafter, the distance between our planet and C/1811 F1 would decrease. Meanwhile, the comet's angular distance from the sun would continue to decrease and would be reaching a minimum of just under 10 degrees during the last days of July and first days of August. A parabolic orbit computed for the comet during this month was predicting that C/1811 F1 would pass perihelion on September 15th at a distance of 1.134 AU from the sun. On the basis of this calculation, Heinrich Wilhelm Matthäus Olbers, in Bremen, predicted that in October this comet would be very bright.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:


3rd day 25 of 6 Mo// I understand that our friends T Scattergood & S Horne had an highly favor'd meeting this day at [Portsmouth](#). – Last evening about 9 OClock departed this life at the house of her Brother Benjamin in Portsmouth Mary Freeborn, She was a friend that promised usefulness in Society & her loss will be felt therein. Her [funeral] will be tomorrow at 3 OClock at the Meeting house. –

RELIGIOUS SOCIETY OF FRIENDS



ASTRONOMY

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 August 2, Friday: The [comet](#) entered Leo and by mid-month would be situated almost due north of the sun.

SKY EVENT


Friend [Stephen Wanton Gould](#) wrote in his journal:

*6th day 2 of 8 Mo// The mind in a comfortable state, for which
I desire to be thankful. Oh how precious it is to feel the mind
sweetened by the circulation of divine love & life*

RELIGIOUS SOCIETY OF FRIENDS

 August 18, Sunday shortly after sunset: The [comet](#) (C/1811 F1) was a little less than 19 degrees from the sun and Honoré Flaugergues in Viviers and Heinrich Wilhelm Matthäus Olbers in Bremen were independently searching for it.

SKY EVENT

 August 20, Tuesday: The great [comet](#) Flaugergues (C/1811 F1), moving through the constellations of Leo and Leo Minor, began to emerge from being obscured by the brightness of the sun.

SKY EVENT

 September 12, Wednesday: Samuel Brown and Adah Healy Brown's son Theophilus Brown was born.

The great [comet](#) Flaugergues (C/1811 F1), while apparently in the constellation of Ursa Major, accomplished its perihelion (this one's trajectory was a very broad ellipse which at its closest point was actually still somewhat outside the orbit of the earth) and began its trip outward.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

*4th day 12 of 9 Mo// At Meeting Mary Morton was concern'd in a
lively & very comfortable testimony to tried exercised states
which she apprehended to be present - C Rodman was also concern'd
to speak a few words. - The meeting a good one to me for which
I desire to be thankful & I think I may express that it seems
to be a season of peculiar favor with me, a season of feeling
wherein my mind is easily brought experience a little of the
incomes of love, that hardness to feel tenderness of spirit is
greatly removed. Oh that I may continue in this state it is what
I love to feel
Went this eveng to the Alms house with Brother D Rodman to see
Joseph where his conduct was such that he was confin'd the first
night of his Arrival.*

RELIGIOUS SOCIETY OF FRIENDS

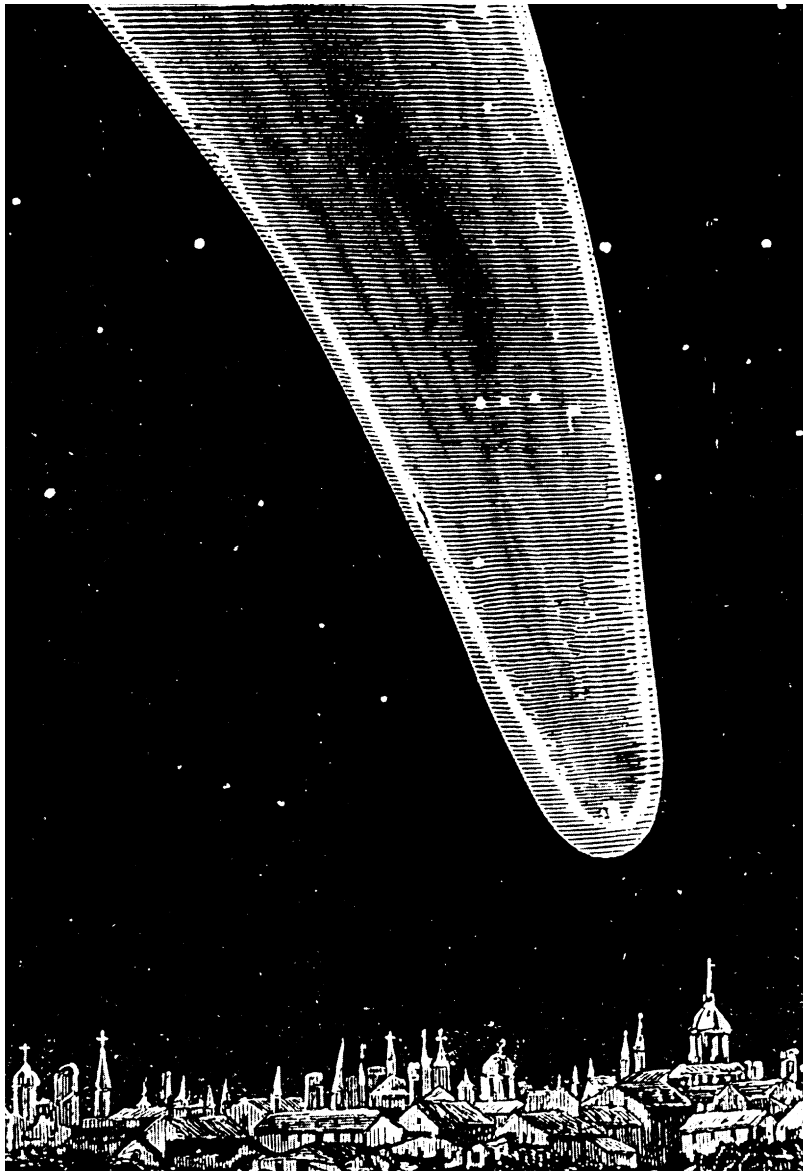
ASTRONOMY

ASTRONOMY



Early October: The great [comet](#) Flaugergues (C/1811 F1) was moving into the north circumpolar skies of the constellation Boötes, providing an all-night display of twin tails of a length of fifteen or sixteen degrees. The grape harvest in France this year was just excellent, the weather during the growing season having been ideal. Wine made from grapes of this 1811 vintage would come to be famous as “comet wine,” and would be enjoyed by its consumers with a grateful nod toward the heavens. The vintage would become so famous that, retrospectively, a claim would be made that indeed during that year there had been an abundance of human twins also born, and it would be recalled that in this year in addition “a shoemaker’s wife in Whitechapel produced four at a birth.” (People **will** try to put two and two together.)

SKY EVENT





ASTRONOMY

ASTRONOMY



October 15, Tuesday: The great [comet](#) Flaugergues (C/1811 F1), transiting from the constellation Boötes into the constellation Hercules, was exhibiting a gas tail of a length of 24 degrees and a curved dust trail that was almost seven degrees in width. Sir William Herschel thought he was able to make out some colors, ruddy for the very prominent apparent nucleus and somewhat bluish-green for the surrounding coma.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

*3rd day 15 of 10 Mo// George & Abby Engs much as yesteeday,
if any alteration it is for the Worse with Abby -*

RELIGIOUS SOCIETY OF FRIENDS



October 20, Sunday: After murdering his brother and nephew, Holkar of Indore died.

At this point, although it was still more than an astronomical unit away, the great [comet](#) Flaugergues (C/1811 F1) was at its closest to Earth. Since the head of this gigantic comet measured at up to 28 arc-minutes in width, which is roughly comparable to the apparent size of the disks of the sun and of the moon, and since it was actually somewhat farther away from us than the sun, it is clear that its tenuous coma (nucleus with surrounding visible gasses) actually exceeded the size of the photosphere of Sol. As the comet would recede, its tail would grow and grow.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

*1st day 20 of 10 Mo// In the forenoon D Buffum delivered a Short
but impressive testimony and in the Afternoon C R was concern'd
to utter nearly these words "Purity of heart occasions clearness
of sight, but the Pollution of our nature beget doubtings which
lead to infidelity," this is a[?] most deplorable situation for
a human being to be in -
We dined at my father's & from the inclemency of the weather my
H omitted Afternoon meeting*

RELIGIOUS SOCIETY OF FRIENDS

ASTRONOMY

ASTRONOMY



December 16, Monday: As the great [comet](#) Flaugergues (C/1811 F1) had been receding, its tail had been lengthening, from 24 degrees to 70 degrees.

SKY EVENT

Centered in [northwestern Arkansas](#), there were two enormous (~7.2-8.1 Richter) earthquake shocks, the 1st at 2:15AM and the 2d at 8:15AM. They said the Mississippi River flowed backwards (which would be to indicate that a seismic “[seiche](#)” propagated upriver). It would be alleged that this had been forecast months before by Tecumseh.

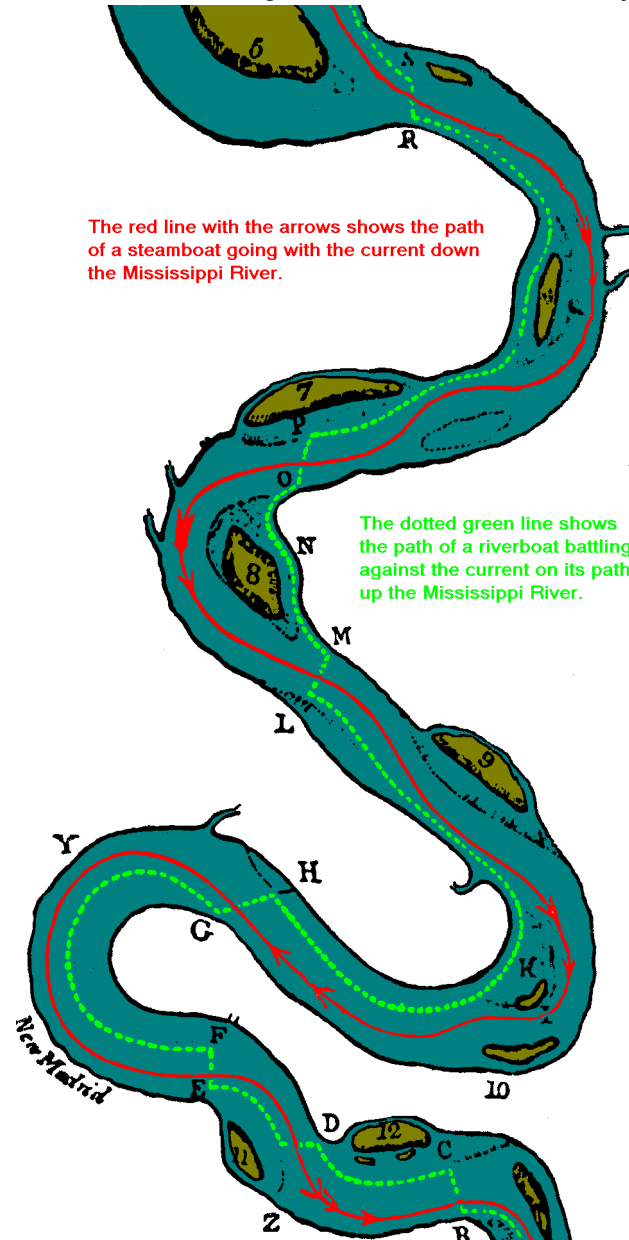


[John James Audubon](#), in Kentucky, hearing the roar of the New Madrid, Missouri earthquake⁷³ and noticing the effects of the enormous earthquake (still inadequately understood) in strange brightenings and darkenings of the sky, presumed that a tornado might be approaching and sought shelter from it.⁷⁴ Just as the steamboat *New Orleans* came out into the smooth waters of the Mississippi, heading downriver after the rapids known as the Falls of the Ohio, without warning the quake struck and the normally very smooth waters of the Mississippi River became agitated into the same sort of turbulent maelstrom from which this steamboat had

73. Am I sure that this is not a reference to the earthquake that would occur on February 7, 1812 at 4:45AM?

74. Notice that it had not yet been clearly established, that comets were extra-atmospheric, astronomical in nature. Some natural philosophers were still holding to a theory that actually a comet was a type of long-lasting atmospheric disturbance, and therefore quite close to the surface of the earth and able to exert a direct influence upon us.

just emerged. Church bells were heard to ding in Boston as the first of four major temblors ripped along the



New Madrid faultline which runs from Arkansas to Illinois. In this initial temblor, presently estimated at 8.1 on the Richter scale, tree trunks snapped — but because of low white population density, only a few dozen people were reported as having been killed. Soil liquefaction along the Mississippi River was, according to our Federal Emergency Management Agency, similar to that experienced during the great Kobe quake of January 1995, and as a result the great river ran backward for three days. Were a temblor of Kobe's 7.0 magnitude to strike along the New Madrid faultline at 9:30AM on some day under our current conditions — and it is estimated that there is a significant probability that some such temblor will occur — the Arkansas State Office of Emergency Services estimates that 14,000 people will die and there will be 240,000 homeless. Since there are presently five major oil and natural gas pipelines running across this faultline, conveying heating fuel to the Eastern seaboard states, if this inevitable disaster should strike during a winter a significant portion of our nation will be subjected to a chilling brush with reality.⁷⁵



ASTRONOMY

ASTRONOMY

There would be follow-on major earthquakes on January 23, 1812 and on February 7, 1812. After this series of major quakes, there would be a new lake in Tennessee, Reelfoot Lake, that had not existed in 1810.

Friend [Stephen Wanton Gould](#) wrote in his journal:

2nd day 16th of 12 M // My H not being Smart I set most of the evening at home & entertained her & myself in reading Sillimans Journal

RELIGIOUS SOCIETY OF FRIENDS



December 31, Tuesday night: A portion of the tail of the great [comet Flaugergues \(C/1811 F1\)](#) was observable.

SKY EVENT

This, the "[Great Comet of 1811](#)," would be given a mention by Tolstoy in WAR AND PEACE:

The radiant star which, after traveling in its orbit with inconceivable velocity through infinite space, seemed suddenly -like an arrow piercing the earth- to remain fast in one chosen spot in the black firmament, vigorously tossing up its tail.

Friend [Stephen Wanton Gould](#) wrote in his journal:

31 of 12 M 1811// Here ends the year & what more shall I say of it than that it has come & gone. I feel my mind humbled at the poor improvement of I have made, but am thankful in believing that tho' I may have taken Some retrograde Steps yet my mind is still visited with the renewals of love & life.

RELIGIOUS SOCIETY OF FRIENDS

1812



January 15, Wednesday: Johannes Herbst died in Salem, [North Carolina](#) at the age of 76.

If one looked carefully, one could still make out the great [comet Flaugergues \(C/1811 F1\)](#) in the night skies, in the constellation Aquarius. (It had been visible since late March in 1811: this had been and still is the longest period of naked-eye visibility of any comet of which we have record.)

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

4th day 15th of 1 Mo// Father seems to look much more poorly than common this mornng [?] & complains of a new infermity vizt a pain in his breast, The left [?], thinks he has a fever, has

75. According to our National Research Council, writing as of 1994, it is simply not yet known "whether the relocation of materials on the surface of the earth is dominated by the slower but continuous fluxes operating all of the time or by the spectacular large fluxes that operate during short-lived cataclysmic events."

ASTRONOMY

ASTRONOMY

prescribed some Medicine & he is better this eveng - tho very feeble - Sister Eliza spent the day with us -

RELIGIOUS SOCIETY OF FRIENDS



July 11, Saturday: United States forces invaded Canada near Detroit.

The boys of the Boston Latin School, including [Ralph Waldo Emerson](#), worked on the fortifications of Fort Strong⁷⁶ on Noddle Island:



The great [comet Flaugergues \(C/1811 F1\)](#) had been invisible even to telescopes due to its position in regard to the sun (astronomers refer to this difficult portion of the sky as the ecliptic), but on this date it was rediscovered by a [telescope](#) in Cuba. Its tail was ten arc-minutes in length.

SKY EVENT


Friend [Stephen Wanton Gould](#) wrote in his journal:

76. This is not the Fort Strong which would be active during our civil strife, as that one would be on the Long Island of Boston Harbor.

ASTRONOMY

ASTRONOMY

*7th day 7 M 11 / Spent lesure time in reading Robert Sutcliff,
I think it an highly valuable publication*

 July 31, Friday: One final [telescopic](#) observation of the great [comet Flaugergues \(C/1811 F1\)](#) was accomplished, as it was entering the constellation of Capricornus. The astronomer Wisniewsky described it as a faint yellowish nebulosity with a diameter of about an arc-minute and a half, without a detectable tail.

SKY EVENT


Francis H. Gregory sallied out of Sackets Harbor, New York hid three gigs among the Thousand Islands and captured a British ship. He then needed to burn his prize in order to avoid its recaptured by a British gunboat.

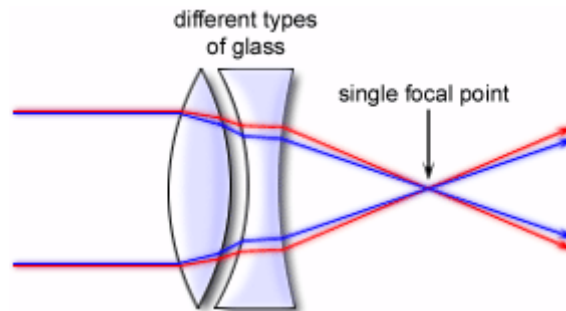
Friend [Stephen Wanton Gould](#) wrote in his journal:

*6th day 7 M 31st / Our little boy being very smart & well we
spent the day at My Mothers with him. – Aunt Gould some better*

RELIGIOUS SOCIETY OF FRIENDS

1813

 The optical refractor [telescope](#), redeemed from its initial problem of chromatic distortion, was by this point coming to dominate [astronomy](#).



HISTORY OF OPTICS

**1814**

The dark lines of the solar spectrum were charted by Joseph von Fraunhofer of Germany. This rediscovery of absorption spectra that had in 1802 been noted by William Hyde Wollaston, but not understood, would help to determine their position with improved precision — and it would be the exactness of their position that eventually would tell us what were the elements that they represented.

HISTORY OF OPTICS

ASTRONOMY



September 5, Monday: General Macomb ordered that 720 sick and invalid troops be conveyed to Crab Island.

In an otherwise clear sky to the northwest of Agen, France, a small, slow-moving, perfectly spherical white cloud appeared at about 11AM. After remaining motionless for a period of time it began to speed toward the south while revolving upon its axis. Observers heard rumbling noises of an ear-shattering intensity culminating in an explosion, and there was a shower of stones of various dimensions. After this the cloud remained stationary, slowly evanescing.

ASTRONOMY

Friend [Stephen Wanton Gould](#) wrote in his journal:

2nd day 5th of 9 M / In addition to all the other unpleasant occurrences of the times the unpleasant information that the Banks of NYork & Philadel had stopd payment of Specie & that the Exchange Bank in [Providence](#) had done the same - This is a renewe'd damper on Trade & credit. - Where we shall get, or what next that is unpleasant will occur is hard to tell, but the times are such that it is not worth while to suffer our expectations to be so raised about any thing as to be disappointed, let what will occur tho' total destruction of Property & the loss of our own & many others lives be the unhapy issue.

RELIGIOUS SOCIETY OF FRIENDS



November: In Philadelphia, during this month and the next, “a [comet](#) is seen.”

SKY EVENT

**1815**

➡ David Brewster of Scotland described the polarization of light by reflection.

HISTORY OF OPTICS

A [comet](#) was discovered by Heinrich Wilhelm Matthias Olbers (1758-1840), an ophthalmologist who could get by on only four hours of sleep per day and was thus able to spend a great deal of time in his well-equipped observatory atop his home near Bremen, Germany.

SKY EVENT

➡ October 3: In the Haute Marne of France, after a loud boom was heard in the small city of Chassigny, a stone fell out of the open sky (enough remains of the original approximately nine pounds for us to understand that this meteorite originated as part of the surface of Mars).

SKY EVENT

1816

➡ Since 1801, light had been regarded as somehow sharing in the characteristics of the waves on the surface of a body of water. During this year and the following one, as a result of investigations by Augustin Jean Fresnel and by Dominique François Arago on the interference of polarized light and the subsequent interpretation of these experiments by Thomas Young, it would be concluded that light waves are “transverse” in nature rather than, as had been supposed, “longitudinal.”

HISTORY OF OPTICS

➡ July 12, Friday: In Paris, M. Rudy lectured on sunspots.

SUNSPOTS

➡ July 13, Saturday: On his way back to Prague from Berlin, Carl Maria von Weber stopped in Carlsbad (Karlovy Vary) where he would remain until the 17th. While there he would meet Count Heinrich Vitzthum von Eckstädt, Intendant of the royal Saxon Theater. Vitzthum would propose that Weber direct a new German language opera company in Dresden.

➡ July 14, Sunday: Friend [Stephen Wanton Gould](#) wrote in his journal:

1st day 14th of 7th M 1816 / In our morning Meeting - C R was first concerned in Testimony & then D Buffum - In the Afternoon Meeting first C R then Anne Greene - which made four sermons today - to me they were pretty good Meetings - Rode home with

“Stack of the Artist of Kouroo” Project



ASTRONOMY

ASTRONOMY

David Buffum & took tea with him & wife - while there Wm Peckham & wife came to lodge there. - On my Way home stoped at Williams & set a while, & at H Goulds & saw his kiln Burning

RELIGIOUS SOCIETY OF FRIENDS



July 16, Tuesday: Friend [Stephen Wanton Gould](#) wrote in his journal:

3rd day 16 of 7 M 1816 / This evening I heard Wm Langley relate the following Anecdote of his life Vizt / When he was quite a lad, his father was quite reduced in his temporal circumstances & so straightened they were, that they hardly knew where each Succeeding Meal was to come from. one day while they were in this Situation a poor Woman called at the door to ask charity & stated her case as very hard, having neither meal nor candle, & a sick daughter to take care of - this mother reply'd that they were nearly in the same situation, their meal was almost out & they had but a candle or two in the houses - Wm said he heard the story with some emotion & recollected a nine pence somebody had given him some time before - he reflected that their case was not quite so bad as the poor womans & perhaps he could assist his father in work & get some more - upon which he ran & got his money, & unbeknown to his parents went to the gate & handed the poor woman in question, & felt quite satisfied with the Act from a strong faith that in the end he should be no losser - The next day as he was walking one of the streets he found a quarter of a Dollar - he then began to consider that his benevolence had proved a blessing to him & determined to give that to the Poor, -accordingly in a few days he met with a poor object on whom he bestowed his quarter of a Dollar - "Well" he adds "it did not end there, for in a few days more he found a half a Dollar" he did not remember of giving that away, but he said the recollection of the circumstance had often proved a Stimulus to impart more freely than he otherwise should have done, on many occasions thro' life. -

This story brought to my recollection another which I believe I have somewhere before inserted in my journal. When I was a boy I used on Seventh days to work in my fathers garden which was just above the Seventh day [Baptist](#) Meeting house, one seventh day as I was going to the garden I stoped at the door to hear Old Parson Bliss preach, while I was there he related the following annecdote probably to excite his hearers to a liberal disposition - he Said there was once a poor Sailor landed at some place I think he said London, with no prospect of bed or board, & his cloaths in a worn condition & with but half a Crown in his pocket - he had not gone far before a poor forlorn looking old woman met him & asked charity, he told her his Situation & if I remember correctly he said the Sailor passed on, reflecting in this manner, that, he was Young & able to work, the poor old woman was unable to obtain any thing by manual labor & perhaps his case was better than hers - on this he steps back & hands her his half Crown, & goes on again reflecting on his destitute situation, but he had not proceeded far before he picked up a Dollar -

I think these storys are worth preserving, & it is probable no



ASTRONOMY

ASTRONOMY

one now living recollects the story of Parson Bliss, but me. circumstances of that kind when heard young, before the mind becomes crowded with cares, takes deep hold & remains with us longer circumstances quite as interesting, related in more advanced life

RELIGIOUS SOCIETY OF FRIENDS



July 18, Thursday: Friend [Stephen Wanton Gould](#) wrote in his journal:

5th day 18th of 7th M 1816 / Went to meeting with a tender mind & set about half an hour enjoying a pretty good condition, but was called out by a lad sent by my bro. Isaac to inform me that his father Hanmet had breathed his last & that they wanted me to assist in putting on his grave cloathes - I repaired to the house & found him gone, performed with the assistance of others the trying task, but unpleasant as such offices are they must be performed & we know not how soon Some kind friend must do the Same for us.-

I regretted to loose the remainder of the meeting particularly as it was preparative meeting & I felt my mind engaged to attend to Some buisness before it, the answers to the queries &c -

RELIGIOUS SOCIETY OF FRIENDS



July 19, Friday: Friend [Stephen Wanton Gould](#) wrote in his journal:

6th day 19th of 7th M 1816 / Attended the funeral of Nathan Hammet & with my H, & Aunt Stanton walked round the common burying ground & saw the graves of many with whom we were acquainted, which solemnly reminded us of the time when we Shall be numbered with them, & suggested the great necessity of a preparation for the great event. -

We took tea with Mother - Aunt Patty Gould was there also -Isaac & Sally at the house of mourning -

RELIGIOUS SOCIETY OF FRIENDS



July 20, Saturday: Friend [Stephen Wanton Gould](#) wrote in his journal:

7th day 20th of 7th M / My H & John spend the day at Jonathon Dennis's with Sister Joanna - it being inconvenient for Br David & me to out there - I took dinner with him -

I often feel thankful, but today & several days of late my heart has been fraught with gratitude, for continued evidences of divine regard, often, as I am sitting alone & as often when I am in the midst of company my heart is tendered with the touches of heavenly good - this I consider a favor for which I know not how to be sufficiently thankful -

RELIGIOUS SOCIETY OF FRIENDS

 July 21, Sunday: Friend [Stephen Wanton Gould](#) wrote in his journal:

*1st day 21st of 7 M / Our Meeting this forenoon was well attended & divers were present whose countenances looked interesting – An Appearance In the ministry & in Supplication, judgement of which I leave. --
In the Afternoon we were Silent - After tea, took John & walked to the Beach. –*

RELIGIOUS SOCIETY OF FRIENDS

 July 22, Monday: Friend [Stephen Wanton Gould](#) wrote in his journal:

2nd day 22nd of 7 M / Ewd W Lawton & Wife & Sister Mary took tea with us, very agreeable & interesting visitors


RELIGIOUS SOCIETY OF FRIENDS

 July 23, Tuesday: Friend [Stephen Wanton Gould](#) wrote in his journal:

3rd day 23rd of 7 M / After tea with Polly Mclish & Sister Ruth took a pleasant walk to D Buffum Jr to see his wife a little while being confined with a slow fever. My H not being very well could not go with us. –

RELIGIOUS SOCIETY OF FRIENDS


1817

 During Thoreau’s lifetime it would be discovered that there was a cycle to sunspot activity, the cycle beginning again about once a decade (actually, this has been averaging about eleven years).

SUNSPOTS


The Sunspot Cycle 1798-1894

MIN / MAX



1798 – 1804
1810 – 1817
1823 – 1830
1834 – 1837
1843 – 1849
1857 – 1860
1867 – 1872
1879 – 1884
1889 – 1894

ASTRONOMY


 Bessel catalogued 3,222 stars.

ASTRONOMY

 February: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):


129	1818	Feb.	25.95890	70	52	58	183	12	9	112	19	11	89	43	48	1.197764		D	Encke.	
130	1818	Dec.	4.09030	90	34	16	357	27	11	93	7	5	62	40	50	0.8479		R	Bessel.	
E	1819	Jan.	27.10423	334	44	5	156	40	5	181	56	0	13	42	30	0.335581	0.8567675	3.588	D	Encke.
			27.34564	335	9	34	157	31	50	182	22	16	13	38	42	0.333982	0.8490883	3.293	D	Encke.
131	1819	June	27.73993	274	8	25	287	39	1	13	30	36	80	43	56	0.3420005		D	Nicolai.	
132	1819	July	31.32915	114	57	18	291	6	9	176	8	51	11	16	53	0.70008	0.60353	2.346	D	Encke.
			18.90021	113	36	43	275	6	48	161	30	5	10	42	48	0.773638	0.7551903	5.618	D	Encke.

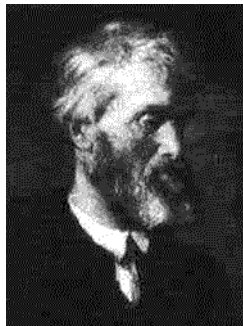
SKY EVENT

 May: Thomas Carlyle commented that he was “now pretty well convinced that a body projected by the earth with a velocity of 39,000 feet per second will never return.”

SKY EVENT

At approximately this point this projectile schoolmaster nicely turned an epigram of Lucian on his spit by offering to another of his tutor friends that “when the Gods have determined to render a man ridiculously miserable, they make a schoolmaster of him.”

Clearly, at this point Carlyle had entered into the spiritual crisis which would consume his life until 1822,  and in which he would abandon his Christianity by embracing the secular nature of the universe of matter.



THOMAS CARLYLE

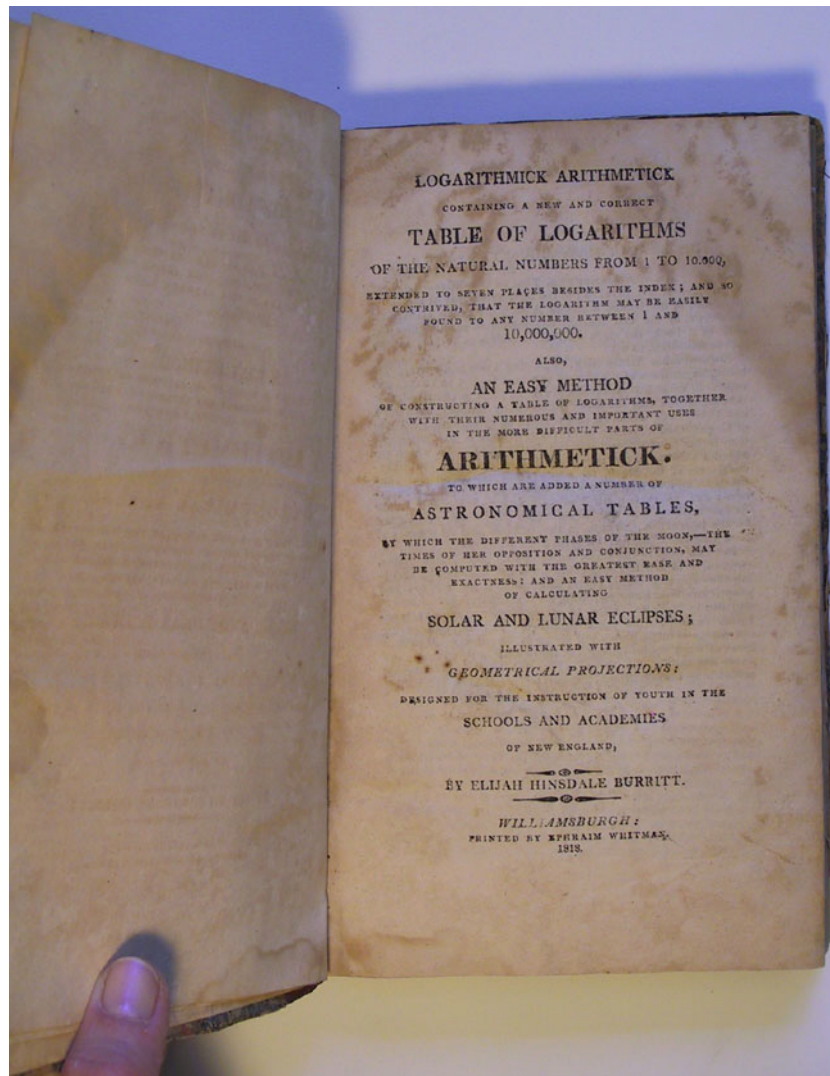


ASTRONOMY

ASTRONOMY



September 15, Tuesday: [Elijah Hinsdale Burritt](#) copyrighted his LOGARITHMICK ARITHMETICK CONTAINING A NEW AND CORRECT TABLE OF LOGARITHMS OF THE NATURAL NUMBERS FROM 1 TO 10,000, EXTENDED TO SEVEN PLACES BESIDES THE INDEX; AND SO CONTRIVED, THAT THE LOGARITHM MAY BE EASILY FOUND TO ANY NUMBER BETWEEN 1 AND 10,000,000. ALSO, AN EASY METHOD OF CONSTRUCTING A TABLE OF LOGARITHMS, TOGETHER WITH THEIR NUMEROUS AND IMPORTANT USES IN THE MORE DIFFICULT PARTS OF ARITHMETICK. TO WHICH ARE ADDED A NUMBER OF ASTROLOGICAL TABLES, BY WHICH THE DIFFERENT PHASES OF THE MOON, — THE TIMES OF HER OPPOSITION AND CONJUNCTION, MAY BE COMPUTED WITH THE GREATEST EASE AND EXACTNESS: AND AN EASY METHOD OF CALCULATING SOLAR AND LUNAR ECLIPSES; ILLUSTRATED WITH GEOMETRICAL PROJECTIONS: DESIGNED FOR THE INSTRUCTION OF YOUTH IN THE SCHOOLS AND ACADEMIES OF NEW ENGLAND, BY ELIJAH HINSDALE BURRITT (Williamsburgh: Printed by Ephraim Whitman, 1818). The author of this LOGARITHMICK ARITHMETICK was a 24-year-old college student and its preface was dated “Williams College, October, 1818.” The table of logarithms takes up merely 44 of the book’s 252 pages — its initial half amounts to a textbook on arithmetic and the final almost half is made up of a treatise on [astronomy](#), with many astronomical tables.



Friend [Stephen Wanton Gould](#) wrote in his journal:

3d day 15 of 9 M / A Thorn has been again engaged today in visiting some families in the forenoon Job Sherman was with her



ASTRONOMY

ASTRONOMY

& this Afternoon I took his place we went first to John Rodmans, next to Perry Weavers [?], then to Aunt Martha Goulds, then to Abigail Barkers, then at Comstocks to see his deaf & dumb son but was dissappointed as he was not at home. then to Thos Townsends where we had (as well as at all the other places) a favor'd time. Anne made full proof of her ministry, & this little opportunity has been a fresh evidence to my mind of the love & goodness of our heavenly father, in that he still visits & revisits the hearts of his children by his holy Spirit & qualifies instruments with the same authority that he did the Apostles to preach the everlasting gospel - This little visit of hers has been perculiarly pleasant as she has seen a number who are dilligent attenders of our meetings, but not members, & of tender visited minds. -

RELIGIOUS SOCIETY OF FRIENDS



September 16, Wednesday: Friend [Stephen Wanton Gould](#) wrote in his journal:

4th day 16th of 9th M 1818 / Anne Thorn attends [Portsmouth](#) meeting today.

RELIGIOUS SOCIETY OF FRIENDS



September 17, Thursday: Friend [Stephen Wanton Gould](#) wrote in his journal:

5th day 17th of 9 M / Our Meeting this day was indeed as an heavenly place the silent part of it was favor'd with a precious covering, under which Anne Thorn rose & deliverd a very copious testimony & reached the states & conditions of many present - to the afflicted, her testimony was like oil whom she was engaged to address particularly

In the course of her exercise I could but acknowledge afresh in my heart that there is no "God like our God" he quallifies poor dust & ashes to proclaim his Word with the same Power with which he cloathed the Apostles & is still condescending in his adorable goodness to raise up those who are willing to stand on his holy Mount to receive his command, to the people & sanctifies their labors, his witness in many minds was reached this day, & may the bread cast on the Waters soon return. - It was a season of refreshment to me, for which I desire to be thankful. She dined at D Buffums & expects to go to [Tiverton](#) tonight from thence to [Providence](#) on her way home.-

RELIGIOUS SOCIETY OF FRIENDS



December: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

129	1818	Feb.	25.95890	70	52	58	183	12	9	112	19	11	89	43	48	1.197764			D	Encke.
130	1818	Dec.	4.09030	90	34	16	357	27	11	93	7	5	62	40	50	0.8479			R	Bessel.
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132	1819	July	31.13915	114	57	18	291	6	9	176	8	51	11	16	53	0.70008	0.60353	2.346	D	Encke.
			18.90021	113	36	43	275	6	48	161	30	5	10	42	48	0.773638	0.7551903	5.618	D	Encke.

SKY EVENT



ASTRONOMY

ASTRONOMY

1819

➡ Hans C. Oersted discovered electromagnetism.

Joseph Fraunhofer of Germany described his investigations of the diffraction of light as it passed through fine gratings — fine gratings which, initially, he had been fabricating by the simple technique of winding fine wires around parallel screws.

HISTORY OF OPTICS

➡ March 4, Thursday: J.W. Pastorff (1767-1838) of Drossen, Germany began to make drawings of the solar disk including sketches of sunspot groups (he would continually generate these sketches until November 4, 1833; the drawings are now in the archives of the Royal Astronomical Society Library).

SUNSPOTS

Friend [Stephen Wanton Gould](#) wrote in his journal:

5th day 4th of 3rd M 1819 / Our meeting was Silent & tho' a part of it was solemn & a good covering experienced in my mind, yet a very considerable part of it was very barran & unsettled. — The fault was doubtless my own, which is no consolation

RELIGIOUS SOCIETY OF FRIENDS

➡ June 26, Saturday: Emma di Resburgo, a melodramma eroico by [Giacomo Meyerbeer](#) to words of Rossi, was performed for the initial time, in Teatro San Benedetto, [Venice](#). This would eventually receive 74 performances.

Abner Doubleday, who would be credited with inventing American [baseball](#), was born.

SPORTS

At about this point a [comet](#) was passing unobserved between the earth and the sun, with the tail of the comet brushing over the earth without producing any noticeable effects. The passage of this comet would not be inferred until, on July 1st, it would be noticed low in the west after sunset.

According to a list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

129	1818	Feb.	25.95890	70	52	58	183	12	9	112	19	11	89	43	48	1.197764			D	Encke.
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			18.90021	113	36	43	275	6	48	161	30	5	10	42	48	0.773638	0.7551903	5.618	D	Encke.

SKY EVENT

➡ July 1, Thursday: [John Keats](#) wrote from Shanklin on the Isle of Wight to Fanny Brawne:

My dearest Lady — I am glad I had not an opportunity of sending



off a Letter which I wrote for you on Tuesday night – 'twas too much like one out of Rousseau's Heloise. I am more reasonable this morning. The morning is the only proper time for me to write to a beautiful Girl whom I love so much: for at night, when the lonely day has closed, and the lonely, silent, unmusical Chamber is waiting to receive me as into a Sepulchre, then believe me my passion gets entirely the sway, then I would not have you see those Rhapsodies which I once thought it impossible I should ever give way to, and which I have often laughed at in another, for fear you should [think me] either too unhappy or perhaps a little mad.

I am now at a very pleasant Cottage window, looking onto a beautiful hilly country, with a glimpse of the sea; the morning is very fine. I do not know how elastic my spirit might be, what pleasure I might have in living here and breathing and wandering as free as a stag about this beautiful Coast if the remembrance of you did not weigh so upon me I have never known any unalloy'd Happiness for many days together: the death or sickness of some one has always spoilt my hours – and now when none such troubles oppress me, it is you must confess very hard that another sort of pain should haunt me.

Ask yourself my love whether you are not very cruel to have so entrammelled me, so destroyed my freedom. Will you confess this in the Letter you must write immediately, and do all you can to console me in it – make it rich as a draught of poppies to intoxicate me – write the softest words and kiss them that I may at least touch my lips where yours have been. For myself I know not how to express my devotion to so fair a form: I want a brighter word than bright, a fairer word than fair. I almost wish we were butterflies and liv'd but three summer days – three such days with you I could fill with more delight than fifty common years could ever contain. But however selfish I may feel, I am sure I could never act selfishly: as I told you a day or two before I left Hampstead, I will never return to London if my Fate does not turn up Pam or at least a Court-card. Though I could centre my Happiness in you, I cannot expect to engross your heart so entirely – indeed if I thought you felt as much for me as I do for you at this moment I do not think I could restrain myself from seeing you again tomorrow for the delight of one embrace.

But no – I must live upon hope and Chance. In case of the worst that can happen, I shall still love you – but what hatred shall I have for another!

Some lines I read the other day are continually ringing a peal in my ears:

*To see those eyes I prize above mine own
Dart favors on another—
And those sweet lips (yielding immortal nectar)
Be gently press'd by any but myself—
Think, think Francesca, what a cursed thing
It were beyond expression!
J.*

Do write immediately. There is no Post from this Place, so you must address Post Office, Newport, Isle of Wight. I know before



ASTRONOMY

ASTRONOMY

*night I shall curse myself for having sent you so cold a Letter;
yet it is better to do it as much in my senses as possible. Be
as kind as the distance will permit to your
John Keats
Present my Compliments to your mother, my love to Margaret and
best remembrances to your Brother – if you please so.*

ASTRONOMY

ASTRONOMY

(The letter would be posted on the 3d.)

Dissension had developed in the Jerusalem, New York sanctuary of the followers of “Universal Friend,” [Jemimah Wilkinson](#), as she had become rather demanding of gifts and special treatment, and had come to institute various punishments for infractions of the rules of the Society of Universal Friends. Finally the community resolved its problem by erecting this two and a half story Federal-style mansion for its inspirational leader at some considerable distance from the other homes. It is now referred to as “Friend House” and is not open to the public:



After spending her last years in isolation, at the age of 67 the religious leader died (or “left time” as her followers described it), and would be interred in a temporary vault in the building’s cellar while her followers faithfully waited for her to come back into animation, and watched as signs of decay accumulated. As her will attests, she had never swerved from the pronouncement she had originally made under the oak tree in [Cumberland, Rhode Island](#) after recovering from [typhoid fever](#), that she had died and her spirit had been replaced with “Divine Spirit.” (Her Jerusalem community would, within the following two decades, entirely disperse. At some later date the decomposing body has been removed from its temporary vault for burial at an unmarked location on the property.)



Last Will and Testament:



ASTRONOMY

ASTRONOMY

The last Will and Testament of the person called the Universal Friend of Jerusalem, in the County of Ontario, State of New York, who in the year 1777, was called Jemima Wilkinson, and ever since that time, the Friend, a new name which the mouth of the Lord hath named.

My will is that all my just debts be paid by my executors, hereafter named.

I give, bequeath and devise unto Rachel Malin and Margaret Malin, now of said Jerusalem, all my earthly property both real and personal; and that is to say all my land lying in said Jerusalem and in Benton, or elsewhere in the County of Ontario, together with all the buildings thereon, to them the said Rachel and Margaret, and their heirs and assigns forever, to be equally and amicably be shared between them, the said Rachel and Margaret – and I do also give and bequeath to the said Rachel and Margaret, all my wearing apparel, all my household furniture, and my horses, cattle, sheep and swine, of every kind, together with all my farming utensils, and all my movable property of every nature and description whatever.

My will is, that all the present members of my family and each of them, be employed if they please, and if employed, supported during their natural life, by the said Rachel and Margaret, and whenever any of them become unable to help themselves, they are according to such inability, kindly to be taken care of by the said Rachel and Margaret. And my will also is, that all poor persons belonging to the society of the Universal Friend, shall receive from the said Rachel and Margaret such assistance, comfort and support during their natural life as they may need; and in case any or either of my family, or others elsewhere in the society shall turn away, such shall forfeit the provisions herein made for them.

I hereby ordain and appoint the above-named Rachel Malin and Margaret Malin, Executors of this my last will and testament.

In Witness whereof, I, the person called Jemina Wilkinson, but in, and ever since the year 1777, known as the Public Universal Friend, have hereunto affixed my name and Seal, this 25th day of the 2d Month, in the year of our Lord 1819.

The Public Universal Friend [L.S.]

In the presence of, &c.

Be it Remembered – That in order to remove all doubt of the due execution of the foregoing will and testament of the person who before the year 1777, was known and called by the name of Jemima Wilkinson, but since that time, as the Universal Friend, do make, publish and declare the within instrument to be my Last Will and Testament, as witness my hand and seal, this 17th day of the 7th month, 1819.

Jemima Wilkinson X

Her Cross or mark,

Or, Universal Friend.

["Witness," &c.]



ASTRONOMY

ASTRONOMY

That evening after sunset the [comet](#) that had passed unnoticed between the earth and the sun on or about June 26th, with its tail brushing over the earth also unnoticed, became visible low in the west. (So much for comets exerting a vast influence!)⁷⁷

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

5th day 1st of 7th M 1819 / Our Meeting looked small in a great room, but I believe nearly all the members were present that are in ability to attend, & several that are not members. – I believe it was a comfortable season to some present, it was in good measure so to me. – Father Rodman delivered a short testimony

RELIGIOUS SOCIETY OF FRIENDS



July 3, Saturday: Dominique François Jean Arago (1786-1853) directed his newly developed polarimeter toward the [comet 1819 II Tralles](#) and observed its tail region through a doubly refracted prism. He detected that the light from the tail, unlike the light given off by stars, was slightly polarized — indicating that it was reflected rather than emitted light.

According to a list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

129	1818	Feb.	25.93890	70	52	58	183	12	9	112	19	11	89	43	48	1.197764			D	Encke.
130	1818	Dec.	4.09030	90	34	16	357	27	11	93	7	5	62	40	50	0.8479			R	Bessel.
E	1819	Jan.	27.10423	334	44	5	156	40	5	181	56	0	13	42	30	0.335581	0.8567675	3.588	D	Encke.
			27.24564	335	9	34	157	31	50	182	22	16	13	38	42	0.333982	0.8490883	3.293	D	Encke.
131	1819	June	27.73993	274	8	25	287	39	1	13	30	36	80	43	56	0.3420005			D	Nicolai.
132	1819	July	31.13915	114	57	18	291	6	9	176	8	51	11	16	53	0.70008	0.60353	2.346	D	Encke.
			18.90021	113	36	43	275	6	48	161	30	5	10	42	48	0.773638	0.7551903	5.618	D	Encke.

SKY EVENT

The 1st savings bank in the USA, the Bank for Savings of New-York, opened its doors for business and received a total of \$2,807.⁰⁰ in deposits.

Friend [Stephen Wanton Gould](#) wrote in his journal:

7th day 3rd of 7th M / A little precious favor this Morning, for which I desire to be thankful. –

RELIGIOUS SOCIETY OF FRIENDS



August 14, Saturday: Apparently, according to a report which appeared in the [American Journal of Science](#), between 8PM and 9PM on the previous evening two women of Amherst MA had observed “a brilliant white light resembling burnished silver” which they supposed to descend slowly from the sky as a ball onto their front yard. At one point this light was bright enough for them to see it reflect upon or cast a shadow against a nearby wall. The next morning, according to a report from a Professor Rufus Graves, the man of the house, an Erastus Dewey, noted that there was in his yard, some 20 feet from the doorstep, a “circular form, resembling a sauce or salad dish bottom upwards, about eight inches in diameter and one in thickness, of a bright buff color, with a fine nap upon it similar to that on milled cloth.... On removing the villous coat, a buff colored pulpy substance of the consistency of good soft soap, of an offensive, suffocating smell appeared; and on a near approach to it, or when immediately over it, the smell became almost insupportable, producing nausea

77. “GREAT COMET, (C/1819 N1=1819 II. Period of naked eye visibility spanned the month of Jul., T=1819 June 28. Also known as [Comet Tralles](#). Spotted on July 1st in the evening sky a little to the north of the Sun, the head being of about zero magnitude. Comet crossed eastern Auriga and was visible at both dusk and dawn for several weeks. At the end of the first week of July, 1st magnitude with a 7-8 degree tail. Comet faded rapidly as it moved toward the northeast, almost pacing the Sun. At mid-month situated in Lynx, an object of 3rd magnitude with a short tail. In the last few days of July the comet’s brightness rapidly approached the naked eye threshold.”



ASTRONOMY

ASTRONOMY

and dizziness. A few minutes exposure to the atmosphere changed the buff into a livid color resembling venous blood. It was observed to attract moisture very rapidly from the air. A half-pint tumbler was nearly half filled with the substance. It soon began to liquefy and form a mucilaginous substance of the consistence, color, and feeling of starch when prepared for domestic use.” Whatever this material was, within two or three days it would evaporate, leaving only some sort of dark-colored residue upon the sides and bottom of that tumbler. It would be noted that when they then rubbed some of this dried residue between their fingers, it became a fine, odorless ash.

SKY EVENT

Samuel Cabot reported his attention to have suddenly been arrested by an object emerging from the sea about 100 to 150 yards from him, “which gave to my mind at the first glance the idea of a horse’s head.... I perceived at a short distance eight or ten regular bunches or protuberances, and at a short interval three or four more.... The Head ... was serpent shaped it was elevated about two feet from the water ... he could not be less than eighty feet long.”

SEA SERPENT SIGHTINGS

After some passage of time, Friend [Moses Brown](#) wrote again to Sophronia N.J. Forster of Weare, New Hampshire, expressing continued interest in her teaching at Yearly Meeting School.

In [Newport, Rhode Island](#), Friend [Stephen Wanton Gould](#) had a conversation with a local [Jew](#) and was reassured about the superiority of [Quakerism](#):

7th day 14th of 8 M / Rec'd two letters from Wm Rickman in N York one of them mentioned that Wm Foster of England had obtained a Certificate from Friends there to pay a religious visit to friends in this Country & expected to embark next spring – This Afternoon my mind was struck in conversation with Moses Lopez a Jew, by a remark of his he was speaking of religion & giving some of his views on the subject & observed that was he to change his religion he should turn [Quaker](#) & remarked that there were some of our manners & customs that he approved beyond others & even some of his own – he Said he was once in [New Bedford](#) & was invited to dine at the house of Our friend Sam Rodman, who provided a good Salt Fish dinner for him & when they set down to the table he observed a profound silence which seemed very strange to him & was at an entire loss what to think or how to account for it but after a few moments, Socobility was resumed & things went on in their usual order, at tea he remarked the same pause, when, (to use his own expressions) he considered it must be some of our ceremonies, & he could but approve of it, being much more solemn in its effects than a prayer rabbled over with apparant feeling or sensibility, he remarked that it was their practice to say a short prayer after dinner, but he says I like Your mode best being more Solemn. now I have no doubt but this poor son of Israel was Struck with real religious feelings on the occasion, which from the dark state of his mind he would not fully comprehend. – This circumstance may tend to confirm Friends of the necessity of such pratices. – we know not the effects of them, if attended too with reverance they may reach the hearts of some, when we are not aware of it ourselves,

& perhaps most effectively when nothing may be uttered



RELIGIOUS SOCIETY OF FRIENDS



November: According to a comet list published in Boston in 1846, attributed to Professor Benjamin Peirce (the fingernail in the photo belongs to Brad Dean, who rooted this information out of the Harvard stacks):

No.	Date.	Greenwich M. S. T. of Peri- helion Passage.	Longitude of Ascend- ing Node.	Longitude of Perihelion.	Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Directio	Name of Computer.
	A. D.	N. S.							y.		
133	1819	Nov. 20.24484	77 39 54	67 44 45	350 4 51	9 1 16	0.892559	0.6867458	4.810	D	Encke.
134	1821	Mar. 21.91198	49 8 35	240 0 10	169 8 25	73 20 0	0.0922882			R	Rumcker.
		Mar. 21.96556	49 5 13	239 53 42	169 11 31	73 33 7	0.0918232			R	Rosenberger.
135	1822	May 5.26008	177 1 31	193 26 47	343 34 44	53 48 36	0.502736			R	Encke.
E	1822	May 23.94618	34 42 59	157 34 56	182 51 57	13 22 25	0.345793	0.8445479	3.318	D	Encke.
136	1822	July 16.02522	5 14 50	220 17 15	237 57 35	37 43 40	0.84612			R	Heiligenstein.
137	1822	Oct. 23.99639	93 29 58	271 53 23	181 17 35	52 39 7	1.1433992	0.9914768	1550	R	Encke.
		23.80102	93 5 50	271 53 23	181 17 35	52 40 41	1.146091	0.9823022	1817	R	Rumcker.
138	1823	Dec. 9.43750	303 25 25	274 35 5	28 30 20	76 12 6	0.2267453			R	Nicolai.
139	1824	July 11.511	134 40 29	260 37 52	234 2 37	54 34 19	0.591263			R	Rumcker.
140	1824	Sept. 29.06645	279 37 53	4 53 15	85 15 22	54 35 32	1.049835			D	Encke.
141	1825	May 30.353	20 38 4	273 25 7	107 12 57	58 35 58	0.9020186			R	Rumcker.
142	1825	Aug. 18.71105	193 17 5	10 35 21	177 18 16	89 41 47	0.8834712			D	Clausen.
143	1825	Dec. 10.68187	216 3 23	319 6 50	256 56 33	33 32 39	1.240849	0.9953690	4386	R	Hansen.
		10.77845	216 5 6	318 49 2	257 16 4	33 31 3	1.045837	0.9562464	152	R	Rumcker.
B	1826	May 18.96231	251 46 6	110 11 19	218 25 13	13 33 15	0.902430	0.7470093	6.737	D	Gambert.
144	1826	Apr. 21.977	10 279 40	55 39 57	24 2.002894	1.0089597				D	Nicolai.
		21.91801	197 56 40	117 19 33	279 22 53	40 0 26	2.007902			D	Nicolai.
145	1826	Apr. 29.03904	40 48 51	36 7 51	4 41 0	5 17 20	1.881167			R	Cluver.
146	1826	Oct. 8.95224	44 25 42	58 7 38	13 41 56	25 57 18	0.85281			D	Argelander.
147	1826	Nov. 18.41206	235 27 10	155 3 20	80 23 50	90 37 50	0.0268914			R	Cluver.
148	1827	Feb. 4.92144	184 46 47	33 49 14	150 57 33	77 35 35	0.50652			R	Heiligenstein.
149	1827	June 7.84112	318 29 10	297 50 24	20 38 46	43 38 45	0.808154			R	Heiligenstein.
150	1827	Sept. 11.69286	149 57 56	251 15 57	258 41 59	54 4 42	0.1378433	0.9992730	2611	R	Cluver. [Mayer.
151	1830	April 9.30062	206 38 28	212 11 44	5 23 16	21 16 28	0.9214454			D	Haedenkampf and

SKY EVENT



ASTRONOMY

ASTRONOMY



November 21, Sunday: A meteor fell during the evening in Chester County, Pennsylvania. “While standing in the open air, we were surprized by a sudden flood of light sufficient to enable us to read the smallest print. We soon discovered a fireball in motion in a direction east northeast, and 50 or 60 degrees above the horizon. It passed a little to the south of our zenith, towards the opposite point of compass, and about 30 degrees above the western horizon it became invisible. This body was, perhaps, about two seconds in progression, before we saw it; from which we infer, that it first appeared about 30 degrees above the eastern horizon; hence it travelled, whilst within view, about 120 degrees in the heavens, and in a period, we believe, of not less than five nor more than ten seconds. The size of the body, when first observed, might be about half that of the full moon. The tail which projected from it was of a conical shape, well defined, and extending from the ball to the apex, about 4 or 5 degrees. No sparks were observed. The whole appeared to be a compact mass of fire, in which was combined all the redness of Mars, and the softer light of the moon. The whole appearance was sublime, beyond description. At about 30 degrees from the zenith, westward, it began rapidly to decline, and in two seconds became, to appearance, extinct; its tail, in the mean time, lengthening to 10 or 15 degrees, forming a narrow red streak of evanescent fire. About three minutes after it had disappeared, a noise was heard resembling cannon, or distant thunder, and in a westerly direction.”

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

1st day 21 of 11th M / Meeting full & D Buffum & father Rodman engaged in lively testimonys. – Silent in the afternoon Was so unwell & sitting painful that I had but little enjoyment & concluded I was but little more use in the Meeting than one of the Posts

RELIGIOUS SOCIETY OF FRIENDS

1820

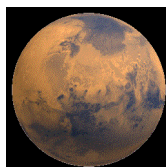


Samuel Lambert’s INFORMATION USEFUL FOR NAVIGATORS was printed in Salem MA by the firm of T.C. Cushing (see following screen). Finding one’s [latitude](#) at sea, if the sky is clear, is a no-brainer. You need to have been keeping track of the days you have been at sea, of course, so you will know what day it is. That’s what your ship’s log is for. Then, for [navigation](#), you need to be able to sight, and identify, a celestial body, and you need to wait and watch until you can see that it is reaching its highest point, its “zenith,” in the sky. Then, while it is making its meridian passage at this highest point, what you do is utilize your nautical instrument to measure the vertical angle which that celestial body makes with the horizon — and then you can look up that angle on the correct page in the handy booklet tables of declination that you took with you when you sailed. (You did remember to bring along your mariner’s booklet of INFORMATION USEFUL FOR NAVIGATORS, right?) For example, if you observe the vertical angle of the sun above the horizon, its altitude in the sky, on a particular [calendar](#) date, to be, say, $40^{\circ}26'34''$, what you will do is subtract that from 90° (for purposes of this subtraction, you need to write down this 90° as $89^{\circ}59'60''$), and if you don’t make any arithmetic errors, the difference you will get will be $49^{\circ}33'26''$. Look up the correct almanac table for the sun’s declination on today’s calendar date per the ship’s log, obtain a figure, and add that figure to your $49^{\circ}33'26''$ figure — and the result will be your present latitude. Write it down in your ship’s log. It is your best clue as to where you are at, since you have still not been able to calculate your [longitude](#), a vastly more difficult problem. For instance, if the sun’s declination in this example is $3^{\circ}41'34''$, the total is $53^{\circ}15'00''$ — and on your map you can see that that is the latitude of Galway Bay, Ireland.

1821

➡ In Georgia, [Elijah Hinsdale Burritt](#) published a 28-page pamphlet [ASTRONOMICA](#), OR DIRECTIONS FOR THE READY FINDING OF ALL THE PRINCIPAL STARS IN THE HEAVENS WHICH ARE NAMED ON CAREY'S CELESTIAL GLOBE. DESIGNED FOR THE AMUSEMENT AND INSTRUCTION OF YOUNG LADIES AND GENTLEMEN WHO ARE WITHOUT THE USUAL MEANS OF GLOBES, CHARTS, ETC. (Printed at the Georgia Advertiser office in Augusta, Georgia).

During this year and the following one Georg Karl Friedrich Kunowsky would be observing the planet [Mars](#) at its opposition, and would be able to come to the conclusion (for the 1st time) that the darker blotches that one can see from time to time on its surface actually were fixed geographic features — rather than, as had been supposed up to that point, transient phenomena of a Martian atmosphere.



➡ March: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#) (the fingernail in the photo belongs to Brad Dean, who rooted out this information in the Harvard stacks):

No.	Date.	Greenwich M. S. T. of Peri- helion Passage.	Longitude of Ascend- ing Node.	Longitude of Perihelion.	Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Directio	Name of Computer.
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		Mar. 21.53656	49 5 13	239 53 42	169 11 31	73 33	7.00918232			R	Rosenberger.
135	1822	May 23.36388	177 1 31	193 26 47	343 34 44	53 48	36.0502736			R	Encke.
E	1822	May 23.36388	42 59	157 34 56	182 51 57	13 22	25.0345793	0.8445479	3.318	D	Encke.
136	1822	July 16.02322	98 14 50	220 17 15	237 57 35	37 43	4.084612			R	Heiligenstein.
137	1822	Oct. 23.99639	3 10 58	271 53 23	181 17 35	52 39	71.1433992	0.9914768	1550	R	Encke.
		23.80102	93 5 50	271 59 45	181 6 5	52 40	41.146091	0.9823022	1817	R	Rumcker.
138	1823	Dec. 9.43750	303 25 25	274 55 5	28 30 20	76 12	6.02267453			R	Nicolai.
139	1824	July 11.511	134 40 29	60 37 12	231 2 37	54 34	19.0591263			R	Rumcker.
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141	1825	May 30.353	20 38 4	273 25 7	107 12 57	58 35	58.09020186			R	Rumcker.
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B	1826	May 18.96231	251 46 6	110 11 19	218 25 13	13 33	15.0902430	0.7470093	6.737	D	Gambert.
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		21.91801	197 56 40	117 19 33	279 22 53	40 0	26.2007902			D	Nicolai.
145	1826	Apr. 29.03904	40 48 51	36 7 51	4 41 0	5 17	2.01881167			R	Cluver.
		8.95224	44 25 42	58 7 38	13 41 56	25 57	18.085281			D	Argelander.
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151	1830	April 9.30062	206 38 28	212 11 44	5 23 16	21 16	28.09214454			D	Haedenkampf and

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

*5th day 1st of 3rd M 1821 / Silent & to me a solid good meeting
The number was rather smaller than usual owing to the bad
Walking. —*

RELIGIOUS SOCIETY OF FRIENDS

HDT

WHAT?

INDEX

ASTRONOMY

ASTRONOMY

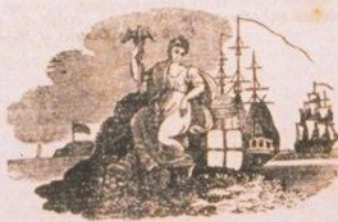
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6553

INFORMATION
USEFUL FOR
NAVIGATORS.

COMPILED BY
SAMUEL LAMBERT,

TEACHER OF NAVIGATION, &c.



SALEM:
SOLD BY CUSHING & APPLETON, S. LAMBERT AND J. W. ARCHER.
T. C. CUSHING, PRINTER.
1820.

72: 11 48




ASTRONOMY

ASTRONOMY

 August 27, Monday: There was an annular [eclipse](#) of the sun (#7218) from Baja California to the tip of Florida.

1822

 February 21, Thursday: There was an annular/total [eclipse](#) of the sun (#7219) from Hudson Bay to Seattle.

Friend [Stephen Wanton Gould](#) wrote in his journal:

*5th day 21 of 2nd M 1822 / A Violent Stormy day & hevy rain,
which raised the brooks so high that only four women could get
to meeting they rode. - The Meeting was silent - The preparative
meeting I thought was remarkably well conducted & it was a
season of quiet & some favor. -*

RELIGIOUS SOCIETY OF FRIENDS

ASTRONOMY

ASTRONOMY



May: Successful prediction of the return of the [comet](#) Encke.



According to a list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#) (the fingernail in the photo belongs to Brad Dean, who rooted out this information in the Harvard stacks):

No.	Date.	Greenwich M. S. T. of Peri- helion Passage.	Longitude of Ascend- ing Node.	Longitude of Perihelion.	Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Directio	Name of Computer.	
	A. D.	N. S.							y.			
133	1819	Nov. 20.24484	77 39 54	67 44 45	350 4 51	9 1 16	0.892559	0.6867458	4.810	D	Encke.	
134	1821	Mar. 21.21198	49 8 35	240 0 10	169 8 25	73 20	0.0922882			R	Rumcker.	
	Mar. 21.53656	49 5 13	239 53 42	169 11 31	73 33	7 0	0.0918232			R	Rosenberger.	
135	1822	May 5.26388	177 1 31	193 26 47	343 34 44	53 48	36 0	0.502736		R	Encke.	
E	1822	May 23.94619	334 42 59	157 34 56	182 51 57	13 22	25 0	0.345793	0.8445479	3.318	D	Encke.
136	1822	July 1.00322	98 14 50	220 17 15	237 57 35	37 43	4 0	0.84612		R	Heiligenstein.	
137	1822	Oct. 23.20339	93 10 58	271 53 23	181 17 35	52 39	7 1	0.1433992	0.9914768	1550	R	Encke.
		23.80102	93 5 50	271 59 45	181 6 5	52 40	41 1	0.146091	0.9823022	1817	R	Rumcker.
138	1823	Dec. 9.43750	30 25 25	274 55 5	28 30 20	76 12	6 0	0.2267453		R	Nicolai.	
139	1824	July 11.511	134 20 29	260 37 52	234 2 37	54 34	19 0	0.591263		R	Rumcker.	
140	1824	Sept. 29.06645	279 37 53	4 53 15	85 15 22	54 35	32 1	0.049835		D	Encke.	
141	1825	May 30.353	20 38 4	263 13 10	12 57	58 35	58 0	0.9020186		R	Rumcker.	
142	1825	Aug. 18.71105	193 17 5	10 35 21	177 18 16	89 41	47 0	0.8834712		D	Clausen.	
143	1825	Dec. 10.68187	216 3 23	319 6 50	256 56 33	33 32	39 1	0.240849	0.9953690	4386	R	Hansen.
		10.77845	216 5 6	318 49 2	257 16 4	33 31	3 1	0.045837	0.9562464	152	R	Rumcker.
B	1826	May 18.96231	251 46 6	6 110 11	19 218 25	13 33	15 0	0.902430	0.7470093	6.737	D	Gambert.
144	1826	Apr. 21.97750	227 53 25	117 31 20	279 40 55	39 57	24 2	0.002894	1.0089597		D	Nicolai.
		21.91801	197 56 40	117 19 33	279 22 53	40 0	26 2	0.007902		D	Nicolai.	
145	1826	Apr. 29.03904	40 48 51	36 7 51	4 41 0	5 17	2 0	0.1881167		R	Cluver.	
146	1826	Oct. 8.95224	44 25 42	58 7 38	13 41 56	25 57	18 0	0.85281		D	Argelander.	
147	1826	Nov. 18.41206	235 27 10	155 3 20	80 23 50	90 37	50 0	0.0268914		R	Cluver.	
148	1827	Feb. 4.92144	184 46 47	33 49 14	150 57 33	77 35	35 0	0.50652		R	Heiligenstein.	
149	1827	June 7.84112	318 29 10	297 50 24	20 38 46	43 38	45 0	0.808154		R	Heiligenstein.	
150	1827	Sept. 11.69286	149 57 56	251 15 57	258 41 59	54 4	42 0	0.1378433	0.9902730	2611	R	Cluver. [Mayer.
151	1830	April 9.30062	206 38 28	212 11 44	5 23 16	21 16	28 0	0.9214454		D	Haedenkampf and	

SKY EVENT



ASTRONOMY


ASTRONOMY



Soon it would be discovered that there was a cycle to sunspot activity, the cycle beginning again about once a decade (actually, this has been averaging about eleven years).

SUNSPOTS

The Sunspot Cycle 1798-1894

	MIN / MAX	
	1798 - 1804	
	1810 - 1817	
	1823 - 1830	
	1834 - 1837	
	1843 - 1849	
	1857 - 1860	
	1867 - 1872	
	1879 - 1884	
	1889 - 1894	




William Cranch Bond of the timekeeper manufacturing firm of William Bond & Sons constructed an astronomical observatory in his home in Dorchester, Massachusetts.

HARVARD OBSERVATORY

ASTRONOMY

ASTRONOMY

ASTRONOMY

 August 28, Thursday: [Giacomo Costantino Beltrami](#) arrived at what he conjectured to be the source of the Mississippi River, as well as the Red River of the North, in what eventually would become the Minnesota Territory, naming the place Giulia after his deceased friend back in Italy, Giulia Spada dei Medici, and naming other lakes nearby after her eight children.



In [Newport, Rhode Island](#), Friend [Stephen Wanton Gould](#) wrote in his journal:

5th day 28th of 8th M / Rode with my H to [Portsmouth](#) to attend the Monthly Meeting - went out the West Road stoped at Uncle Peter Lawtons - In the first Meeting [-] Dennis & Father Rodman bore short testimonies - [-] the last Jonathon Nichols of Salem published his intentions of Marriage with Sister Elizabeth Rodman & Welcome Congdon of [Providence](#) his intentions of marriage with Mary Dennis. - The young folk behaved with circumspection, their countenances bespeaking that [their] minds were impressed with the importance of the [-] State of life they were about to enter. - we dined at Uncle Thurstons, as did also Jonathon & Elizabeth, Father & Mother Rodman, David Buffum & wife, Brother David Rodman & his wife, & Sister Ruth & Mary Rodman.

After dinner Rode down to Uncle Stantons & took tea with them, where I found My Mother ins usual health & spirits. - The Life of religion has been low with me today, but have made some [-] ausens] after it, with a little success. -

RELIGIOUS SOCIETY OF FRIENDS

On approximately this day, [Waldo Emerson](#) wrote in his JOURNAL:

Tuesday Morning I engaged Mr Bartlett to bring me to Mrs Shepard's.... After spending three days very pleasantly at Mrs Shepard's, among orators, botanists, mineralogists, & above all, Ministers, I set off on Friday Morning with Thos Greenough & another little cousin in a chaise to visit Mount Holyoke. How high the hill may be, I know not; for, different accounts make it 8, 12, & 16 hundred feet from the river. The prospect repays the ascent and although the day was hot & hazy so as to preclude a distant prospect, yet all the broad meadows in the immediate vicinity of the mountain through which the Connecticut [sic] winds, make a beautiful picture seldom rivalled. After adding our names in the books to the long list of strangers whom curiosity has attracted to this hill we descended in safety without encountering rattlesnake or viper that have given so bad fame to the place. We were informed that about 40 people ascend the mountain every fair day during the summer. After passing through Hadley meadows, I took leave of my companions at Northampton bridge, and crossed for the first time the far famed Yankee river.... In the afternoon I set out on my way to Greenfield intending to pass the Sabbath with George Ripley.... By the light of the Evening star, I walked with my reverend uncle [the Reverend Ripley], a man who well sustains the character of an aged missionary.... After a dreamless night, & a most hospitable entertainment I parted from Greenfield & through an unusually fine country, crossed the Connecticut (shrunk to a rivulet in this place somewhere in Montagu).... From Mr Haven's garret bed I sallied forth Tuesday mornng [sic] towards Hubbardston, but my cramped limbs made little speed. After dining in Hubbardston I walked seven miles farther to Princeton designing to ascend Wachusett with my tall cousin Thomas Greenough if I should find him there, & then set out for home in the next day's stage. But when morning came, & the stage was brought, and the mountain was a mile & a half away - I learned again an old lesson, that, the beldam Disappointment sits at Hope's door. I jumped into the stage & rode away, Wachusett untrod.... Close cooped in a stage coach with a score of happy dusty rustics the pilgrim continued his ride to Waltham, and alighting there, spent an agreeable evening at Rev. Mr Ripley's Home he came from thence the next morning, right glad to sit down once more in a quiet wellfed family - at Canterbury.



VENUS
 GEORGE RIPLEY

➡ One Sunday in October: [Waldo Emerson](#) was deeply impressed by a “Discourse upon Revelation” by the Reverend [William Ellery Channing](#), preaching in the Reverend [Frederic Henry Hedge](#)’s Federal Street Church in [Boston](#):

I heard Dr Channing deliver a discourse upon Revelation as standing in comparison with Nature. I have heard no sermon approaching in excellence to this, since the Dudleian Lecture. The language was a transparent medium, conveying with the utmost distinctness, the pictures in his mind, to the minds of the hearers. He considered God’s word to be the only expounder of his works, & that Nature had always been found insufficient to teach men the great doctrines which Revelation inculcated. Astronomy had in one or two ways an unhappy tendency. An universe of matter in which Deity would display his power & greatness must be of infinite extent & complicate relations and of course too vast to be measured by the eye & understanding of man. Hence errors. Astron. reveals to us infinite number of worlds like our own accommodated for the residence of such beings as we of gross matter. But to kindle our piety & urge our faith, we do not want such a world as this but a purer, a world of morals & of spirits. La Place has written in the mountain album of Switzerland his avowal of Atheism. Newton had a better master than Suns & Stars. He learned of heaven ere he philosophized, & after travelling through mazes of the universe he returned to bow his laurelled head at the feet of Jesus of Nazareth. Dr C. regarded Revelation as much a part of the order of things as any other event. It would have been wise to have made an abstract of the Discourse immediately.

ASTRONOMY

➡ December: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

138	1823	Dec.	9.43750	303	25	25	274	55	5	28	30	20	76	12	60.2267453			R	Nicolai.
139	1824	July	11.511	134	40	29	260	37	52	234	2	37	54	34	190.591263			R	Rumcker.
140	1824	Sept.	29.06645	279	37	53	4	53	15	85	15	22	54	35	321.049835			D	Encke.
141	1825	May	30.353	20	38	4	273	25	7	107	12	57	58	35	580.9020186			R	Rumcker.
142	1825	Aug.	18.71105	193	17	5	10	35	21	177	18	16	89	41	470.8834712			D	Clausen.
143	1825	Dec.	10.68187	216	3	23	319	6	50	256	56	33	33	32	391.240849	0.9953690	4386	R	Hansen.
			10.77845	216	5	6	318	49	2	257	16	4	33	31	310.45837	0.9562464	152	R	Rumcker.
R	1826	May	18.96231	251	46	6	110	11	10	218	25	13	13	23	150.0000000				

SKY EVENT

1824

➡ April 27, Tuesday: [Edward Bliss Emerson](#)'s exercise in mathematics (25 ¾ x 38 ¾ in., Thesis #285, HUC 8782.514) was exhibited at [Harvard College](#). It consisted of a calculation and projection predicting the path across the face of the earth of the shadow of an [eclipse](#) of the sun that would be occurring during May 1836.

RECORDS ARCHIVE

Les trois genres, a scene lyrique by Adrien Boieldieu and Daniel-Francois-Esprit Auber to words of Scribe, Dupaty and Pichat, was performed for the initial time, in the Theatre de l'Odeon, Paris.

➡ July: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

138	1823	Dec.	9.43750	303	25	25	274	55	5	28	30	20	76	12	60.2267453			R	Nicolai.
139	1824	July	11.511	134	40	29	260	37	52	234	2	37	54	34	190.591263			R	Rumcker.
140	1824	Sept.	29.06645	279	37	53	4	53	15	85	15	22	54	35	321.049835			D	Encke.
141	1825	May	30.353	20	38	4	273	25	7	107	12	57	58	35	580.9020186			R	Rumcker.
142	1825	Aug.	18.71105	193	17	5	10	35	21	177	18	16	89	41	470.8834712			D	Clausen.
143	1825	Dec.	10.68187	216	3	23	319	6	50	256	56	33	33	32	391.240849	0.9953690	4386	R	Hansen.
			10.77845	216	5	6	318	49	2	257	16	4	33	31	310.45837	0.9562464	152	R	Rumcker.
R	1826	May	18.96931	951	46	6	110	11	10	918	95	13	13	23	150.0000000				

SKY EVENT

➡ September: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

138	1823	Dec.	9.43750	303	25	25	274	55	5	28	30	20	76	12	60.2267453			R	Nicolai.
139	1824	July	11.511	134	40	29	260	37	52	234	2	37	54	34	190.591263			R	Rumcker.
140	1824	Sept.	29.06645	279	37	53	4	53	15	85	15	22	54	35	321.049835			D	Encke.
141	1825	May	30.353	20	38	4	273	25	7	107	12	57	58	35	580.9020186			R	Rumcker.
142	1825	Aug.	18.71105	193	17	5	10	35	21	177	18	16	89	41	470.8834712			D	Clausen.
143	1825	Dec.	10.68187	216	3	23	319	6	50	256	56	33	33	32	391.240849	0.9953690	4386	R	Hansen.
			10.77845	216	5	6	318	49	2	257	16	4	33	31	310.45837	0.9562464	152	R	Rumcker.
R	1826	May	18.96931	951	46	6	110	11	10	918	95	13	13	23	150.0000000				

SKY EVENT

1825

➡ May 20, Friday: [George Phillips Bond](#) was born.

ASTRONOMY

HARVARD OBSERVATORY

➡ May: According to a comet list published in Boston in 1846, attributed to Professor Benjamin Peirce:

138	1823	Dec.	9.43750	303	25	25	274	55	5	28	30	20	76	12	60.2267453			R	Rumcker.
139	1824	July	11.511	134	40	29	260	37	52	234	2	37	54	34	190.591263			R	Rumcker.
140	1824	Sept.	29.06645	279	37	53	4	53	15	85	15	22	54	35	321.049835			D	Encke.
141	1825	May	30.353	20	38	4	273	25	7	107	12	57	58	35	580.9020186			R	Rumcker.
142	1825	Aug.	18.71105	193	17	5	10	35	21	177	18	16	89	41	470.8834712			D	Clausen.
143	1825	Dec.	10.68187	216	3	23	319	6	50	256	56	33	33	32	391.240849	0.9953690	4386	R	Hansen.
			10.77845	216	5	6	318	49	2	257	16	4	33	31	31.045837	0.9562464	152	R	Rumcker.
R	1826	May	18.96931	251	46	6	110	11	10	218	25	13	13	23	150.0000000				

SKY EVENT

During this year a comet exhibited a tail with five distinct branches, 14 degrees in length (I don't know, however, whether that would be #141, #142, or #143 on the table above).

➡ August: According to a comet list published in Boston in 1846, attributed to Professor Benjamin Peirce:

138	1823	Dec.	9.43750	303	25	25	274	55	5	28	30	20	76	12	60.2267453			R	Rumcker.
139	1824	July	11.511	134	40	29	260	37	52	234	2	37	54	34	190.591263			R	Rumcker.
140	1824	Sept.	29.06645	279	37	53	4	53	15	85	15	22	54	35	321.049835			D	Encke.
141	1825	May	30.353	20	38	4	273	25	7	107	12	57	58	35	580.9020186			R	Rumcker.
142	1825	Aug.	18.71105	193	17	5	10	35	21	177	18	16	89	41	470.8834712			D	Clausen.
143	1825	Dec.	10.68187	216	3	23	319	6	50	256	56	33	33	32	391.240849	0.9953690	4386	R	Hansen.
			10.77845	216	5	6	318	49	2	257	16	4	33	31	31.045837	0.9562464	152	R	Rumcker.
R	1826	May	18.96931	251	46	6	110	11	10	218	25	13	13	23	150.0000000				

SKY EVENT

During this year a comet exhibited a tail with five distinct branches, 14 degrees in length (I don't know, however, whether that would be #141, #142, or #143 on the table above).

➡ December: According to a comet list published in Boston in 1846, attributed to Professor Benjamin Peirce:

138	1823	Dec.	9.43750	303	25	25	274	55	5	28	30	20	76	12	60.2267453			R	Rumcker.
139	1824	July	11.511	134	40	29	260	37	52	234	2	37	54	34	190.591263			R	Rumcker.
140	1824	Sept.	29.06645	279	37	53	4	53	15	85	15	22	54	35	321.049835			D	Encke.
141	1825	May	30.353	20	38	4	273	25	7	107	12	57	58	35	580.9020186			R	Rumcker.
142	1825	Aug.	18.71105	193	17	5	10	35	21	177	18	16	89	41	470.8834712			D	Clausen.
143	1825	Dec.	10.68187	216	3	23	319	6	50	256	56	33	33	32	391.240849	0.9953690	4386	R	Hansen.
			10.77845	216	5	6	318	49	2	257	16	4	33	31	31.045837	0.9562464	152	R	Rumcker.
R	1826	May	18.96931	251	46	6	110	11	10	218	25	13	13	23	150.0000000				

SKY EVENT

During this year a comet exhibited a tail with five distinct branches, 14 degrees in length (I don't know, however, whether that would be #141, #142, or #143 on the table above).⁷⁸

78. “COMET PONS, (C/1825 N1=1825 IV). Visible with the unaided eye from late Aug. until the end of Dec., T=1825 December 11. An intrinsically very bright comet with an exceptionally long period of naked eye visibility. Seen with the naked eye for the first time in late August as a 5th magnitude object in the head of Taurus in the morning sky. Comet moved to the southwest. In mid-September, about 4th magnitude, tail up to 8 degrees long. In mid-October, visible most of the night while in Sculptor, magnitude 2-3 with a tail spanning 14 degrees. Soon thereafter situated too far south to be well seen from Europe and American. In early November, apparently a 2-3 magnitude object in Indus in the southern evening sky. Lost in the evening twilight toward the end of December when probably still magnitude 3-4 and located in Sagittarius to the southeast of the Sun.”

1826

➡ From this year to 1843, the cyclic variation of the number of [sunspots](#) would be being observed by Heinrich Schwabe. This would lead Rudolf Wolf, in 1848, to begin the keeping of systematic records of individual spots and of spot groupings.

ASTRONOMY



➡ February 27, Monday: Captain Wilhelm von Biela was searching the skies, having accepted the calculation of Joseph Morstadt that a [comet](#) seen in 1772 and a comet seen on November 10, 1805 were the same object returning repeatedly, and sure enough, on this night he was able to detect that object returning as predicted. What would become known as Biela's Comet would remain visible on this visit for 72 days.

B	1826	May	18.96231	251	46	6	110	11	19	218	25	13	13	33	15	0.902430	0.7470093	152	R	Rumker.
144	1826	Apr.	21.97761	197	50	25	117	31	20	279	40	55	39	57	24	2.002894	1.0089597	6.737	D	Gambert.
			21.91801	197	56	40	117	19	33	279	22	53	40	0	26	2.007902			D	Nicolai.
145	1826	Apr.	29.03904	40	48	51	36	7	51	4	41	0	5	17	2	0.1881167			D	Nicolai.
146	1826	Oct.	8.95224	44	25	42	58	7	38	13	41	56	25	57	18	0.85281			R	Cluver.
147	1826	Nov.	18.41206	235	27	10	155	3	20	80	23	50	90	37	50	0.0268914			D	Argelander.
148	1827	Feb.	4.92144	184	46	47	33	49	14	150	57	33	77	35	35	0.50652			R	Cluver.
149	1827	June	7.84112	318	29	10	297	50	24	20	38	46	43	38	45	0.808154			R	Heiligenstein.
150	1827	Sept.	11.69286	149	57	56	251	15	57	258	41	59	54	4	42	0.1378433	0.9992730	2611	R	Heiligenstein.
151	1830	April	9.30062	206	38	28	212	11	44	5	23	16	21	16	28	0.9214454			D	Cluver. [Mayer. Haedenkampf and

SKY EVENT

ASTRONOMY

ASTRONOMY

 May: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):


B	1826	May	18.96231	251	46	6	110	11	19	218	25	13	13	33	15	0.902430	0.7470093	152	R	Rumker.
144	1826	Apr.	21.97761	197	50	25	117	31	20	279	40	55	39	57	24	2.002894	1.0089597	6.737	D	Gambert.
			21.91801	197	56	40	117	19	33	279	22	53	40	0	26	2.007902			D	Nicolai.
145	1826	Apr.	29.03904	40	48	51	36	7	51	4	41	0	5	17	20	0.1881167			D	Nicolai.
146	1826	Oct.	8.95224	44	25	42	58	7	38	13	41	56	25	57	18	0.85281			R	Cluver.
147	1826	Nov.	18.41206	235	27	10	155	3	20	80	23	50	90	37	50	0.0268914			D	Argelander.
148	1827	Feb.	4.92144	184	46	47	33	49	14	150	57	33	77	35	35	0.50652			R	Cluver.
149	1827	June	7.84112	318	29	10	297	50	24	20	38	46	43	38	45	0.808154			R	Heiligenstein.
150	1827	Sept.	11.69286	149	57	56	251	15	57	258	41	59	54	4	42	0.1378433	0.9992730	2611	R	Heiligenstein.
151	1830	April	9.30062	206	38	28	212	11	44	5	23	16	21	16	28	0.9214454			R	Cluver. [Mayer.
																			D	Haedenkamp and

SKY EVENT

 October: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

B	1826	May	18.96231	251	46	6	110	11	19	218	25	13	13	33	15	0.902430	0.7470093	152	R	Rumker.
144	1826	Apr.	21.97761	197	50	25	117	31	20	279	40	55	39	57	24	2.002894	1.0089597	6.737	D	Gambert.
			21.91801	197	56	40	117	19	33	279	22	53	40	0	26	2.007902			D	Nicolai.
145	1826	Apr.	29.03904	40	48	51	36	7	51	4	41	0	5	17	20	0.1881167			D	Nicolai.
146	1826	Oct.	8.95224	44	25	42	58	7	38	13	41	56	25	57	18	0.85281			R	Cluver.
147	1826	Nov.	18.41206	235	27	10	155	3	20	80	23	50	90	37	50	0.0268914			D	Argelander.
148	1827	Feb.	4.92144	184	46	47	33	49	14	150	57	33	77	35	35	0.50652			R	Cluver.
149	1827	June	7.84112	318	29	10	297	50	24	20	38	46	43	38	45	0.808154			R	Heiligenstein.
150	1827	Sept.	11.69286	149	57	56	251	15	57	258	41	59	54	4	42	0.1378433	0.9992730	2611	R	Heiligenstein.
151	1830	April	9.30062	206	38	28	212	11	44	5	23	16	21	16	28	0.9214454			R	Cluver. [Mayer.
																			D	Haedenkamp and


SKY EVENT

 November 18, Saturday: A [comet](#) had appeared in this year, on its way toward the sun and already with a very long tail. For a period, it had exhibited two tails. On this date it whipped around the sun at a distance of 0.03 astronomical units, passing at this close approach directly between the sun and the earth.

B	1826	May	18.96231	251	46	6	110	11	19	218	25	13	13	33	15	0.902430	0.7470093	152	R	Rumker.
144	1826	Apr.	21.97761	197	50	25	117	31	20	279	40	55	39	57	24	2.002894	1.0089597	6.737	D	Gambert.
			21.91801	197	56	40	117	19	33	279	22	53	40	0	26	2.007902			D	Nicolai.
145	1826	Apr.	29.03904	40	48	51	36	7	51	4	41	0	5	17	20	0.1881167			D	Nicolai.
146	1826	Oct.	8.95224	44	25	42	58	7	38	13	41	56	25	57	18	0.85281			R	Cluver.
147	1826	Nov.	18.41206	235	27	10	155	3	20	80	23	50	90	37	50	0.0268914			D	Argelander.
148	1827	Feb.	4.92144	184	46	47	33	49	14	150	57	33	77	35	35	0.50652			R	Cluver.
149	1827	June	7.84112	318	29	10	297	50	24	20	38	46	43	38	45	0.808154			R	Heiligenstein.
150	1827	Sept.	11.69286	149	57	56	251	15	57	258	41	59	54	4	42	0.1378433	0.9992730	2611	R	Heiligenstein.
151	1830	April	9.30062	206	38	28	212	11	44	5	23	16	21	16	28	0.9214454			R	Cluver. [Mayer.
																			D	Haedenkamp and

SKY EVENT

1827

 The invention of a glass-pressing machine, used by the American manufacturer Deming Jarves in his Boston and Sandwich Glass Company (1825-1888), permitted the manufacturing of inexpensive and mass-produced glass articles.

GLASS WINDOWS

ASTRONOMY

ASTRONOMY

➡ Although [Edmond Halley](#) had cataloged the star Eta Carinae in 1677 as one of only the 4th magnitude, and during the early 19th century it had been a run-of-the-mill variable star, sometimes appearing at 4th magnitude, sometimes at 2d, in this year it rose to 1st magnitude. We can now use the Hubble Space Telescope to inspect what had been happening:




 February: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

148	1827	Feb.	4.92144	184	46	47	33	49	14	150	57	33	77	35	35	0.0268914		R	Argelander.
149	1827	June	7.84112	318	29	10	297	50	24	20	38	46	43	38	45	0.808154		R	Cluver.
150	1827	Sept.	11.69286	149	57	56	251	15	57	258	41	59	54	4	42	0.1378433	0.9992730	R	Heiligenstein.
151	1830	April	9.30062	206	38	28	212	11	44	5	23	16	21	16	28	0.9214454	2611	R	Heiligenstein.
																		D	Cluver. [Mayer. Haedenkampf and


 June: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

[illegible]


 September: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

148	1827	Feb.	4.921144	184	46	47	33	49	14	150	57	33	77	35	35	0.0268914		R	Argelander.
149	1827	June	7.841112	318	29	10	297	50	24	20	38	46	43	38	45	0.808154		R	Cluver.
150	1827	Sept.	11.69286	149	57	56	251	15	57	258	41	59	54	4	42	0.1378433	0.9992730	R	Heiligenstein.
151	1830	April	9.30062	206	38	28	212	11	44	5	23	16	21	16	28	0.9214454	2611	R	Heiligenstein.
																		D	Cluver. [Mayer. Haedenkampf and


1828

 William Nicol of Scotland invented a prism made from two calcite components. This polarization device would become known as the “nicol prism.”

HISTORY OF OPTICS

 April: College senior [Charles Chauncy Emerson](#)’s exercise in mathematics (21 ½ x 27 ½ in., Thesis #341, HUC 8782.514), the solution of an [astronomical](#) problem, was exhibited at [Harvard College](#).

RECORDS ARCHIVE

 November 30, Sunday: Johann Franz Encke (1791–1865)’s [comet](#) returned.

SKY EVENT



In [Providence, Rhode Island](#), Friend [Stephen Wanton Gould](#) wrote in his journal:

1st day 30 of 11 M 1828 / Both Meetings silent but solid opportunities to me. –

RELIGIOUS SOCIETY OF FRIENDS



ASTRONOMY

ASTRONOMY

1829

➡ Although [Elijah Hinsdale Burritt](#) had of course never been overt while residing in a place like Georgia about any antislavery views that he might or might not have brought down with him from New England, he was of course known locally to be a Yankee. Friends in the north had mailed some antislavery pamphlets to him and unfortunately someone came into his office and happened to pick up one of these pamphlets — and saw it for what it was. The teacher and astronomer would be compelled to flee the south in fear of his life, one jump ahead of a tar-and-feathers party, taking none of his possessions, which of course would be stolen by various local activists. Back home in Connecticut he would open a boarding and day school at which instruction would be offered “in the higher English studies and in the ancient and modern languages,” and he would convert the upstairs of this school building into his observatory in which he would install a [telescope](#) and other apparatus. His brother [Elihu Burritt](#), 17 years his junior, would attend this school for a time and would assist in the teaching.

➡ August 15, Saturday: At about half an hour past midnight, a fireball was seen crossing the sky above Deal, New Jersey, and several booms were heard. A stone fragment of meteorite would be found, about three inches in length. This stone would be placed on display at the Academy of Natural Sciences in Philadelphia.

ASTRONOMY

1830



The 1st course of lectures offered by the Salem Lyceum consisted of:

The Salem Lyceum — 1st Season

Daniel A. White of Salem
Advantages of Knowledge

John Brazer of Salem
Authenticity of Ancient Manuscripts

Francis Peabody of Salem
Steam Engine

Abel L. Peirson of Salem
Physiology

George Choate of Salem
Geology

Thomas Spencer of Salem
Optics

Charles G. Putnam of Salem
Nervous System

Thomas Cole of Salem
Astronomy

Stephen C. Phillips of Salem
Reading of a Lecture written by E. Everett of the Workingmen's Party

Stephen C. Phillips of Salem
Public Education, with a sketch of the origin of the public schools of Salem

Henry Colman of Salem
Human Mind

Joshua B. Flint
Respiration

Joshua B. Flint
Circulation of the Blood

Joshua B. Flint
Digestion

By this year the observed position of the 7th planet Uranus, which had been discovered in 1781, was deviating so much from its calculated position (about half a minute of space), as to cause speculation that there must be another massive object out there beyond it, as yet undiscovered (this 8th planet would be observed in 1845, and named Neptune).

ASTRONOMY

RELIGIOUS SOCIETY OF FRIENDS

SKY EVENT

ASTRONOMY

RELIGIOUS SOCIETY OF FRIENDS

ASTRONOMY

ASTRONOMY



December: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#).⁸⁰

* For other orbits of this remarkable Comet, see Ann. Almanac of 1844, p. 97.

No.	Date.	Greenwich M. S. T. of Peri- helion Passage.	Longitude of Ascend- ing Node.	Longitude of Peri- helion.	Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Direction.	Name of Computer.
	A. D.	N. S.	" "	" "	" "	" "	" "	" "	y.		
152	1830	Dec. 27.6604	338 9 2	311 15 14	26 53 48	44 45 30	0.1258874			R	Wolfers.
153	1832	Apr. 26.02156	72 41 47	228 10 41	204 31 6	43 18 31	1.183603			R	Bouvard.
B	1832	Nov. 26.11687	248 29 33	110 14 40	221 45 7	13 13 31	0.8790864	0.7514480	6.650	D	Baranowski.
154	1833	Sept. 10.024	322 49 58	221 30 38	158 40 40	7 26 17	0.44977			D	Peters.
155	1834	April 2.821	226 14 41	276 40 13	50 25 32	5 59 48	0.51246			R	Rumker.
156	1835	Mar. 30.68738	59 8 30	206 21 57	212 46 33	9 2 42	2.05149			R	W. Bessel.
		27.57651	58 32 23	207 55 33	210 36 50	9 7 39	2.041308			R	Santini.
H	1835	Nov. 15.94153	55 21 41	304 42 17	110 39 24	17 45 35	0.5863639	0.9674023	76.290	D	Lundhal.
157	1840	Jan. 4.47112	120 6 15	192 20 38	72 14 23	53 5 41	0.6184594			R	Kysdeus.
158	1840	Mar. 12.9541	236 13 45	79 43 48	156 29 57	59 14 31	1.221652			R	Loomis.
		13.19598	236 58 48	80 20 17	156 38 31	59 12 36	1.204500	0.9932341	2423	R	Rumker.
159	1840	April 2.49544	186 11 6	324 20 49	229 50 17	79 51 52	0.748333			D	Gotze.
160	1840	Nov. 13.66422	249 3 29	22 39 37	133 36 8	57 57 52	1.4809610	0.9706716	360	R	Petersen.
161	1842	Dec. 15.95707	207 55 43	327 23 48	240 31 55	73 34 4	0.1504425			R	Gould.
162	1843*	Feb. 27.40173	0 27 28	278 41 22	81 46 6	35 50 14	0.0055824	0.9998308	189½	D	Hind.
163	1843	May 6.17612	157 20 6	281 40 42	124 20 36	52 45 57	1.6171643			D	Gotze.
		6.02329	157 20 17	281 33 14	124 12 57	52 44 11	1.6158267			D	Gotze.
		6.01872	157 20 20	281 35 8	124 14 48	52 44 46	1.616335	0.9998202	852040	D	Petersen.
164	1843	Oct. 18.29404	209 23 46	50 16 8	100 52 22	11 18 46	1.6921300	0.5500864	7.293	D	Agardh.
		18.32585	209 23 45	50 17 16	100 53 31	11 18 42	1.6922135	0.5499640	7.291	D	Goldschmidt.
		17.47791	209 33 9	49 49 59	100 16 50	11 21 28	1.6923778	0.5541125	7.394	D	Santini.
		17.87639	209 28 0	50 4 23	100 36 23	11 20 46	1.6934827	0.5526020	7.366	D	Argelander.
		18.43706	209 19 59	50 18 40	100 58 41	11 16 56	1.690232	0.5485724	7.245	D	Nicolai.
165	1844	Sept. 2.47595	63 53 0	342 35 16	278 42 16	2 54 46	1.186249	0.6171573	5.459	D	Hind.
		2.50462	63 56 31	342 37 46	278 41 15	2 54 27	1.185387	0.6158599	5.421	D	

SKY EVENT

80. "GREAT COMET OF 1831, (C/1831 A1=1830 II). Period of naked eye visibility spanned the month of January 1831, T=3D1830 December 28. Comet not discovered until late in what must have been a very spectacular apparition. In early December of 1830 should have been a bright morning object for the Southern Hemisphere. Crossed over into the evening sky at mid-month while approaching the Sun. During the final week of the year the comet should have been of great brilliance, perhaps exceeding Venus, when an evening object near the Sun. Moved west returning to the morning sky. Comet finally discovered on January 7, 1831 at dawn in Serpens, magnitude about +2 with an appendage measuring a couple of degrees in length. Quickly waned and at mid month was already about 4th magnitude with a 3° tail. Lost to the unaided eye before month's end."

Since the rightmost column in this 19th-Century table is headed "Name of Computer," we might suppose that the column would be made up of names like IBM, Apple, Dell, Compaq, etc. It is, however, populated with names like "Wolfers." Before "typewriter" meant a mechanical device, it meant a person whose function it was to operate that machine, and before "computer" meant an electronic device, it meant a person whose function it was to make meticulous calculations such as these.

1831



February: In August of this year there would be an obscurement of the sun which would cause much alarm in America, and, from the “confession” of [Nat Turner](#) in his jail cell later in this year, we can now learn that his thinking had at that time been:

And by signs in the heavens that it would make known to me when I should commence the great work, and until the first sign appeared I should conceal it from the knowledge of men; and on the appearance of the sign, I should arise and prepare myself, and slay my enemies with their own weapons. And immediately on the sign appearing in the heavens, the seal was removed from my lips, and I communicated the great work laid out for me to do, to four in whom I had the greatest confidence (Henry, Hark, Nelson, and Sam).

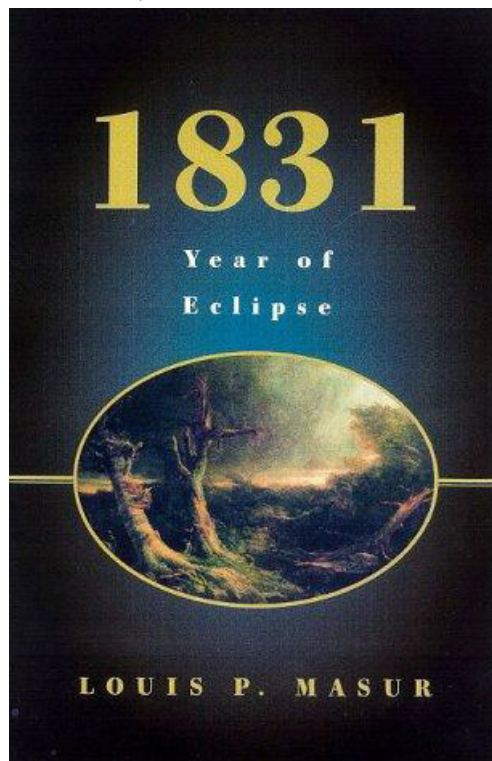


Here is the standard uncorroborated and undocumented and, indeed, uninvestigated and inaccurate, eclipse theory of this, an interpretation which strangely places the sign in the heavens in the month of February, half a year earlier than in the month of August when Turner’s insurrection actually went down — per J.S.

Bowmen's CAMBRIDGE DICTIONARY OF AMERICAN BIOGRAPHY (emphasis added):

Turner, Nat (1800-31): Leader of [slave](#) insurrection, born in Southampton County, Virginia, USA. He was born on the Virginia plantation of Benjamin Turner, who allowed him to be instructed in reading, writing, and religion. Sold three times in his childhood and hired out to John Travis (in the 1820s), he became a fiery preacher and leader of African-American slaves on Benjamin Turner's plantation and in his Southampton County, Va, neighbourhood, claiming that he was chosen by God to lead them from bondage. Believing in signs and hearing divine voices, **he was convinced by an [eclipse of the sun \(1831\)](#)** that the time to rise up had come and he enlisted the help of four other slaves in the area. An insurrection was planned, aborted, and rescheduled; then, on August 21-2, he and six other slaves killed the Travis family, managed to secure arms and horses, and enlisted about 75 other slaves in a disorganized insurrection that resulted in only the murder of 51 white people. Afterwards, he hid nearby successfully for six weeks until his discovery, conviction, and hanging at Jerusalem, Va, along with 16 of his followers. The incident put fear in the heart of Southerners, ended the organized emancipation movement in that region, resulted in even harsher laws against slaves, and deepened the schism between [slaveholders](#) and free-soilers that would culminate in the Civil War.

This standard uncorroborated and undocumented and, indeed, uninvestigated and inaccurate, eclipse theory has recently been perpetuated by the incautious "historian" Louis P. Masur, in his 1831: YEAR OF ECLIPSE (Hill and Wang, 2001. ISBN: 0-8090-4118-9):



The circumstances of any and all partial or total [eclipses](#) of the sun that might possibly have been viewed by an ignorant Nat Turner as alleged in that CAMBRIDGE DICTIONARY OF AMERICAN BIOGRAPHY above, who had



ASTRONOMY

ASTRONOMY

been born in 1800 and was executed in 1831, at any point during his lifetime in North America, would be exhaustively iterated as follows:

Date	Greatest Eclipse	Type	Saros #	Gamma	Eclipse Mag.	Lat.	Long.	Sun Alt.	Path Width	Center Dur.
1801 Apr 13	04:08	P	145	1.315	0.420	61.3N	11.7E	0		
1801 Sep 08	05:54	P	112	1.466	0.160	61.1N	168.4W	0		
1802 Aug 28	07:12	A	122	0.757	0.937	51.3N	105.7E	41	354	05m35s
1803 Aug 17	08:25	A	132	-0.005	0.966	13.6N	54.7E	90	124	03m47s
1804 Feb 11	11:16	H	137	0.705	1.000	26.7N	4.4W	45	0	00m00s
1805 Jan 30	18:57	P	147	1.465	0.167	62.7N	152.8W	0		
1805 Jun 26	23:27	P	114	1.046	0.935	65.5N	9.8W	0		
1806 Jun 16	16:24	T	124	0.320	1.060	42.2N	64.5W	71	210	04m55s
1807 Nov 29	11:42	H	139	0.538	1.014	11.1N	3.9E	57	55	01m26s
1808 Nov 18	02:30	P	149	1.187	0.657	69.2N	162.7E	0		
1809 Apr 14	20:07	A	116	0.874	0.943	65.8N	157.3W	29	436	04m35s
1810 Apr 04	01:41	A	126	0.103	0.997	11.1N	153.8E	84	12	00m21s
1811 Sep 17	18:43	A	141	0.680	0.934	43.0N	85.9W	47	330	06m51s
1812 Feb 12	20:28	P	108	1.355	0.341	70.7N	168.8W	0		
1812 Sep 05	19:04	P	151	1.394	0.287	71.8N	4.5E	0		
1813 Feb 01	08:58	A	118	0.715	0.982	28.0N	40.4E	44	91	01m53s
1814 Jul 17	06:30	T	133	0.164	1.077	30.9N	84.7E	80	254	06m33s
1815 Jul 06	23:43	T	143	0.906	1.059	88.1N	162.8W	25	469	03m13s
1816 Nov 19	10:17	T	120	0.841	1.023	35.0N	41.5E	32	145	02m00s
1817 May 16	06:58	A	125	-0.205	0.948	7.9N	78.5E	78	194	06m30s
1818 May 05	07:16	A	135	0.544	0.946	45.8N	52.5E	57	233	05m05s
1819 Apr 24	11:32	P	145	1.258	0.522	61.7N	108.1W	0		
1819 Sep 19	13:03	Pe	112	1.526	0.058	61.0N	75.7E	0		
1820 Sep 07	14:00	A	122	0.825	0.933	51.6N	8.7E	34	433	05m49s
1821 Aug 27	15:19	A	132	0.067	0.966	13.6N	47.7W	86	123	03m38s
1822 Feb 21	19:40	A	137	0.691	1.000	28.6N	132.3W	46	2	00m02s
1823 Feb 11	03:03	P	147	1.454	0.185	62.0N	76.7E	0		
1823 Jul 08	06:56	P	114	1.118	0.795	64.6N	131.9W	0		



ASTRONOMY

ASTRONOMY

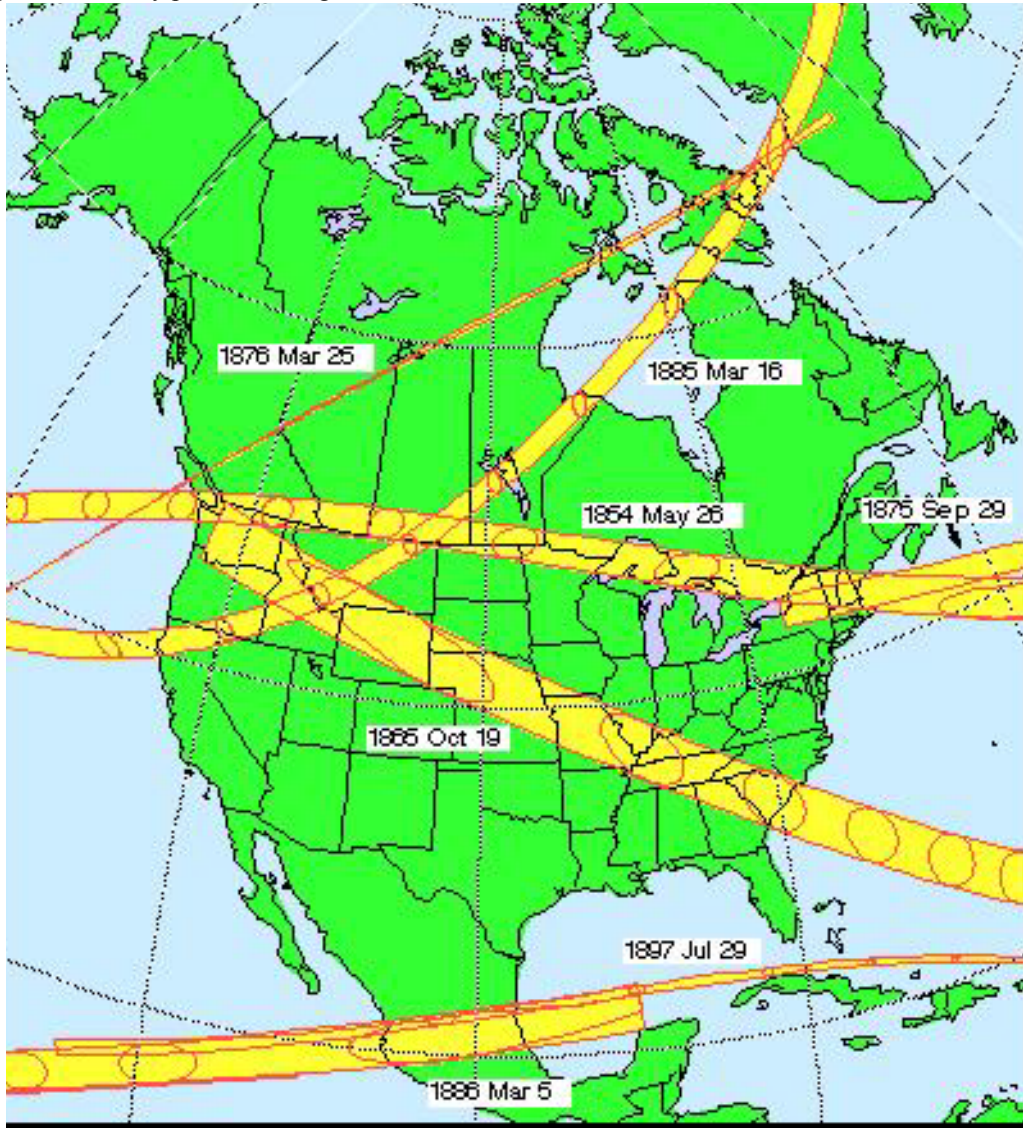
Date	Greatest Eclipse	Type	Saros #	Gamma	Eclipse Mag.	Lat.	Long.	Sun Alt.	Path Width	Center Dur.
1824 Jun 26	23:46	T	124	0.396	1.058	46.6N	171.4W	66	207	04m31s
1825 Jun 16	12:19	H	134	-0.381	1.004	1.0N	6.0W	68	13	00m25s
1825 Dec 09	20:22	H	139	0.530	1.015	9.2N	127.4W	58	60	01m34s
1826 Nov 29	11:14	P	149	1.176	0.677	68.2N	20.0E	0		
1827 Apr 26	03:11	A	116	0.932	0.946	74.8N	73.4E	21	560	03m53s
1828 Apr 14	09:19	Hm	126	0.150	1.003	17.9N	37.7E	81	10	00m18s
1829 Sep 28	01:47	A	141	0.624	0.932	34.9N	164.4E	51	323	07m43s
1830 Feb 23	05:04	P	108	1.372	0.309	71.3N	48.9E	0		
1830 Sep 17	02:08	P	151	1.332	0.393	72.1N	115.5W	0		
1831 Feb 12	17:22	A	118	0.729	0.981	31.9N	88.3W	43	100	01m57s

There is only one solar [eclipse](#) of the 38-odd calculated in the above table, as having occurred at some point on the northern hemisphere of the earth during [Nat Turner](#)'s lifetime, which could possibly qualify as the initiator of the timing of his revolt, and that would have been the one marked in red letters on the above list, the very last entry before his execution, the one which had occurred on February 12, 1831. However, that solar eclipse (#7243) had been merely a partial (annular) one passing across the continent from Baja California to Massachusetts in such an entirely glancing manner as to be viewable for less than two minutes just north of Silas, Alabama (31.5N 88.2W) even in its partiality, and might be plausible as an explanation for the timing of the [slave](#) revolt only had Turner been a Mississippi bottomlands plantation freedom fighter rather than a tidewater freedom fighter in the vicinity of the Great Dismal Swamp and Newport News, Virginia (36.6N 76.3W). Our astronomers haven't even bothered to put this little local February 12, 1831 Alabama nibble thingie upon their chart of historically significant annular eclipses in the USA, none of which it seemed ever

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passed over any portion of Virginia:



To expand upon this ridiculousness, there was also a total [eclipse](#) on August 7, 1831, the totality of which lasted for almost three and a half minutes, and that of course was precisely timed to be unquestionably the cause of this August 21, 1831 American freedom fight — but that total solar eclipse had been viewable only along a path 160 miles wide in the vicinity of Rarotonga (21.1S 159.5W) in the [Cook Islands](#) chain in the Southern Hemisphere, for instance by the Reverend John Williams of the London Missionary Society at his

post there in that remote reach of the South Pacific.

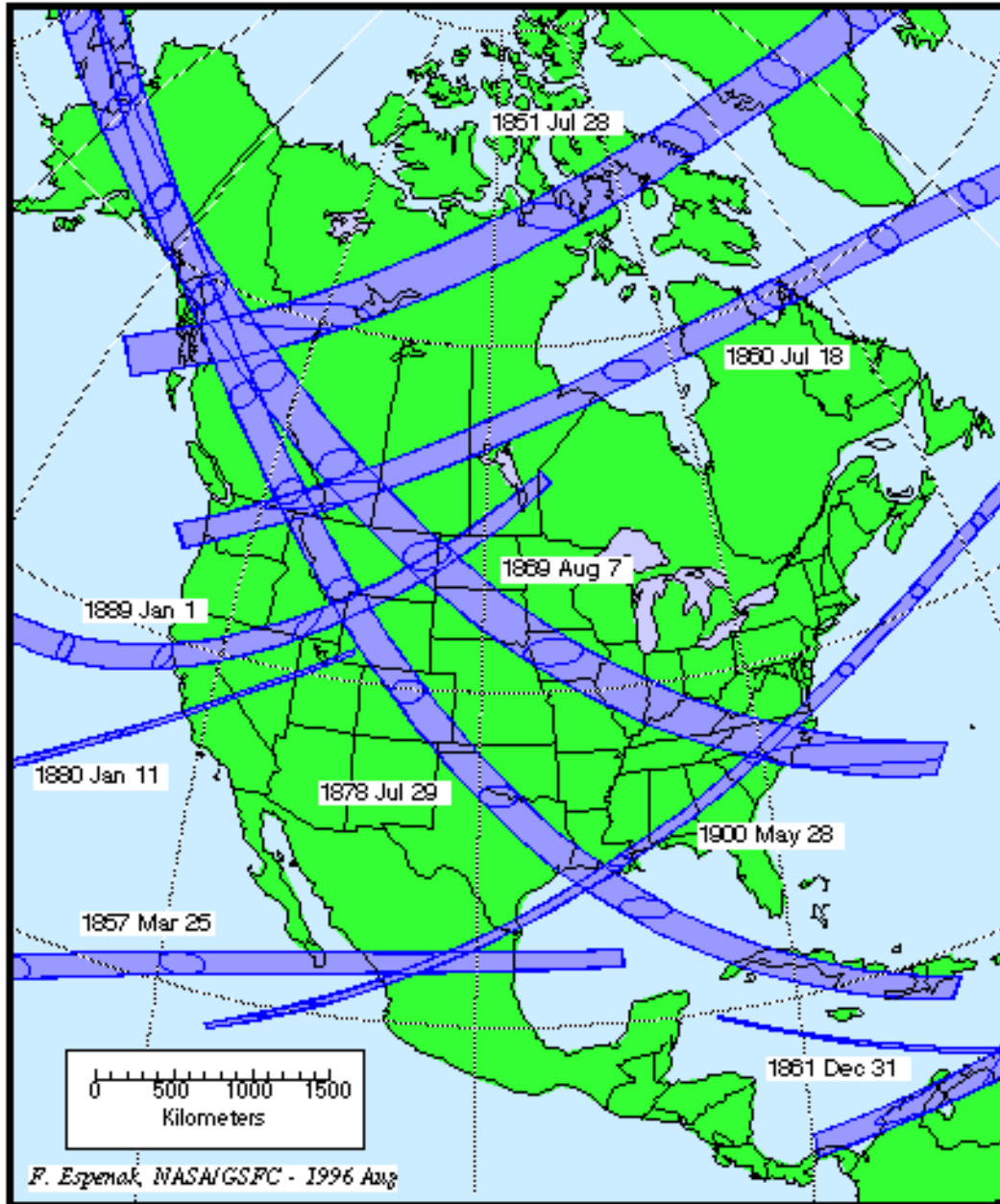


Although there has indeed been a total [eclipse](#) of the sun that might qualify for the honor of triggering ignorant

ASTRONOMY

ASTRONOMY

expectations in tidewater Virginia, that event would not transpire until May 28th in the year 1900:



How then to account for the explanation offered by [Nat Turner](#) in his confinement awaiting his execution and rendering? For three days the sun appeared, all the way from New York down into South Carolina, to have changed in color. This atmospheric disturbance has been characterized as “The Three Blue Days” centering upon August 12th. Some superstitions white people in Philadelphia had announced this to be “a sad augury of coming evil” and Turner had interpreted it as a black hand appear to cross the sun (“as the black spot passed over the sun, so shall the black pass over the earth”), while other persons reported that they believed they had seen in the heavens, emerging from “a long narrow (or serpentine) silvery colored belt,” the letters **G – O – D**.

But this has not been an [eclipse](#). The phenomenon had been caused by high altitude smoke given off by an

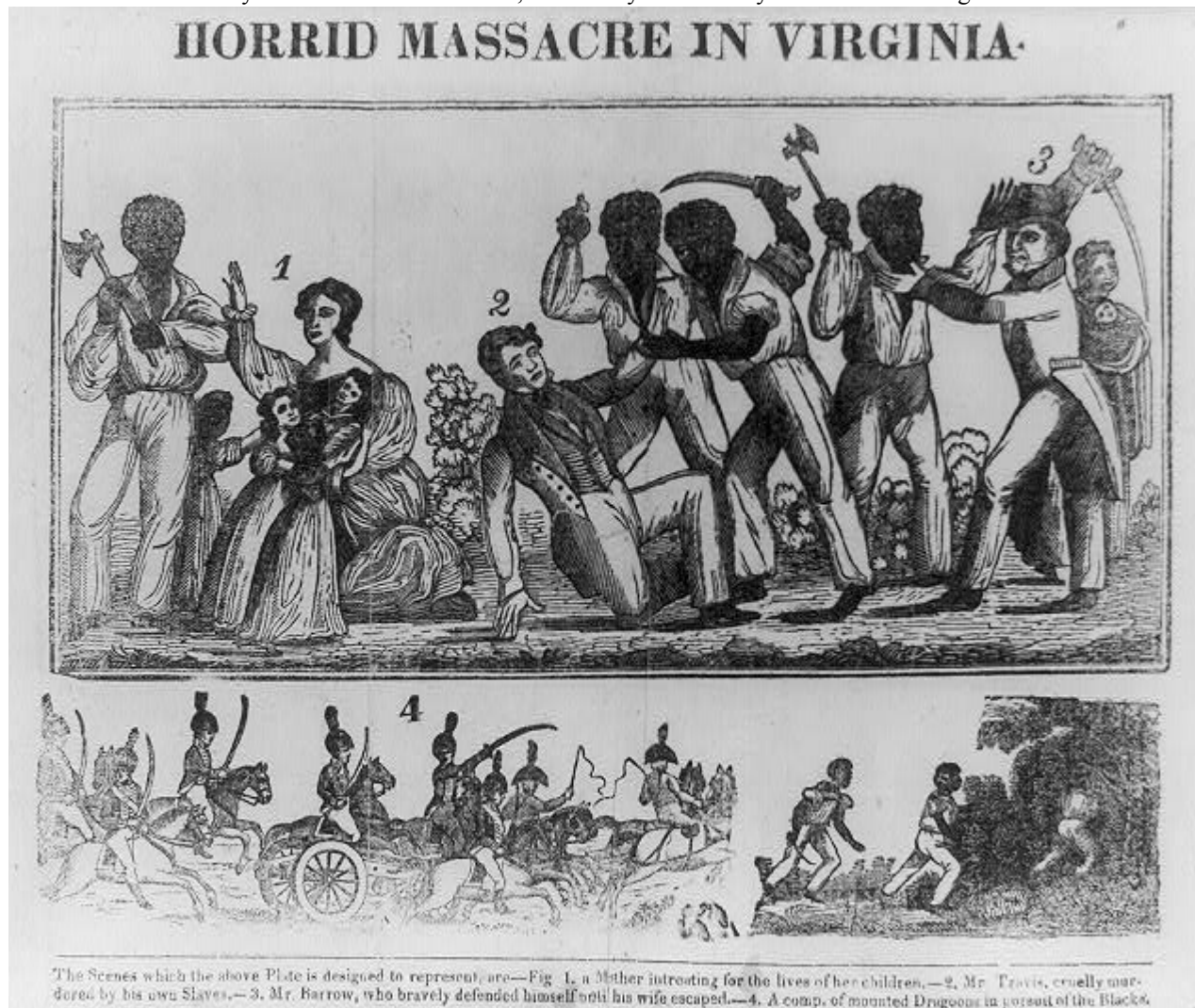
ASTRONOMY

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immense forest fire in Canada.

Why does it matter, whether the trigger event influencing the timing of the revolt had been a solar obscurement rather than an eclipse? Here is the reason. What had occurred was a one-time, quite mysterious event, which all across our nation in the absence of factual information received weird spontaneous explanation.

To presume that Nat Turner was so ignorant and sprang from such a deprived culture, that people like him would not have known what a solar [eclipse](#) was, and would therefore have been subject to such serious misunderstandings when one occurred, actually is of a piece with the 19th-Century story that when Turner's body was rendered after his death, his skull was discovered to be as thick as that of a sheep. We should beware of the one story as we beware of the other, as not only unnecessary but also demeaning.



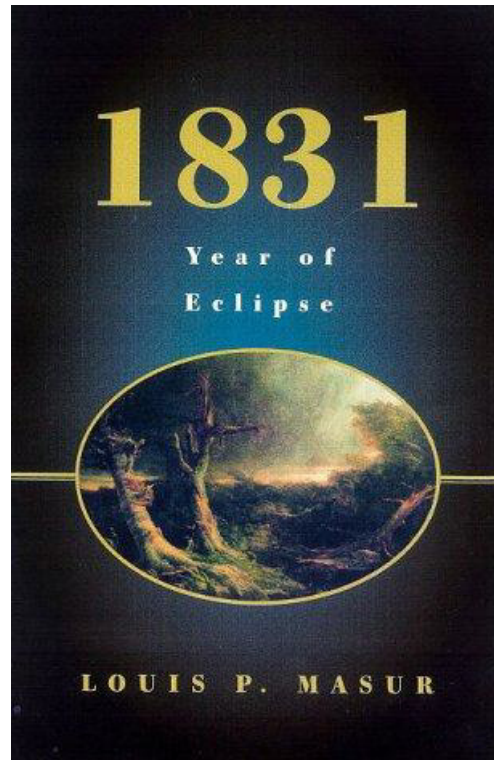
ASTRONOMY

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February 12, Saturday: At this point the Glasgow Skating Club's *SKATERS MANUAL* contained descriptions of 13 combined [skating](#) figures.

According to Chapter I of the history of this year by Professor Louis P. Masur, titled *1831: YEAR OF ECLIPSE* (Hill and Wang, 2001. ISBN: 0-8090-4118-9), everyone, presumably even [Nat Turner](#), even the recreational [skaters](#) on the frozen Delaware River, knew that an eclipse was coming:



Everyone knew it was coming. "THE GREAT ECLIPSE OF 1831 will be one of the most remarkable that will again be witnessed in the United States for a long course of years," alerted *ASH'S POCKET ALMANAC*. One editor reported that the February 12 eclipse would even surpass historic occasions when "the darkness was such that domestic fowls retired to roost" and "it appeared as if the moon rode unsteadily in her orbit, and the earth seemed to tremble on its axis." On the day of the eclipse, from New England through the South, Americans looked to the heavens. One diarist saw "men, women and children ... in all directions, with a piece of smoked glass, and eyes turn'd upward." The *Boston Evening Gazette* reported that "this part of the world has been all anxiety ... to witness the solar eclipse.... Business was suspended and thousands of persons were looking at the phenomena with intense curiosity." "Every person in the city," noted the *Richmond Enquirer*, "was star gazing, from bleary-eyed old age to the most bright-eyed infancy."

Unlike previous celestial events, thought some commentators, the eclipse of 1831 would not produce superstitious dread that the world would end. "Idle fears and gloomy forebodings of evil formerly raised by the appearance of phenomena caused by the regular operation of natural laws," one writer claimed, "have yielded to pleasing admiration; a change which the march of



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science and general diffusion of knowledge have largely contributed to effect." Another writer mocked the notion that eclipses were "signs or forerunners of great calamities." Eclipses, he thought, "necessarily result from the established laws of the planetary revolution, and take place in exact conformity with those laws.... Those who entertain the opinion that eclipses of the sun are tokens of the Divine displeasure can produce no warrant from scripture for their irrational belief. If we would look for the signs of the displeasure of God towards a nation, we can see them, not in eclipses, but in national sins and depravity of morals."

Rational explanations of atmospheric events, however, offered little solace to most Americans. In many, "a kind of vague fear, of impending danger -a prophetic presentiment of some approaching catastrophe"- was awakened, and "the reasonings of astronomy, or the veritable deductions of mathematical forecast," did little to diminish the anxiety. One correspondent reported that an "old shoe-black accosted a person in front of our office, the day previous to the eclipse, and asked him if he was not afraid. For, said he, with tears in his eyes, the world is to be destroyed to-morrow; the sun and moon are to meet ... and a great earthquake was to swallow us all! - Others said the sun and the earth would come in contact, and the latter would be consumed. Others again, were seen wending their ways to their friends and relations, covered with gloom and sadness; saying that they intended to die with them!" The day after the eclipse, preachers employed LUKE 21:25 as the text for their sermons: "there shall be signs in the sun." "In strict propriety of language," one minister observed, "it is not the sun that is eclipsed. Not the slightest shadow is cast upon the least portion of his broad disk. His beams are shot forth precisely the same. It is over us only that the momentary darkness is spread, and it is truly the earth that is eclipsed."

The spectacle, however, proved anticlimactic. "The darkness being less visible than generally expected," the heaven-gazers felt "bamboozled." "At the moment of greatest obscuration," reported one paper, "a foolish feeling of disappointment was generally prevalent and this was expressed by many in such terms as they might have used after having been taken in by the quacking advertisement of an exhibitor of fireworks or phantasmagoria. It was not half as dark as they expected." "The darkness was that of a thunder gust," snorted one observer: "The light of the sun was sickly, but shadows were very perceptible." "The multitude have been sadly disappointed," reported one editor. "They looked for darkness and the shades of light; they expected to drink in horrors, and feel the power of superstition without its terrors or apprehensions; they expected to work by candlelight, see cows come home, and poultry go ultimately to roost -to count the stars and tell them by their names; in short, to see something that they might talk about now and hereafter-

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something to tell their children and grandchildren."



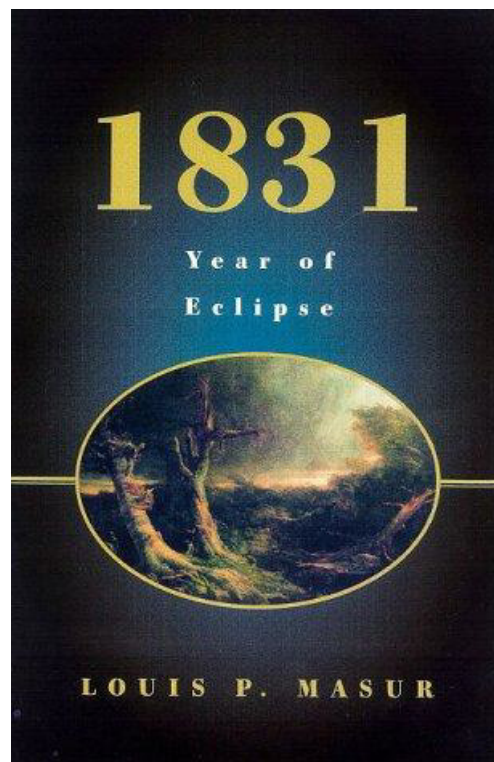
With the anticipation more disturbing than the event, some sought to cast blame. Almanac makers and newspaper editors were chastised for their extravagant predictions of darkness and glowing descriptions of the wonders that would be seen. Some thought the astronomers deserved condemnation for offering elaborate calculations that fizzled. Others blamed regional temperaments for the heightened expectations. "Our Yankee proneness to exaggeration," thought the Boston Patriot, "was manifested in a ludicrous manner on the occasion of the late eclipse." Southerners agreed: "Our eastern brethren are, as usual, up in arms about the matter – they talk of a convention. Truth to say, expectations were scarcely realized. On such occasions, people now-a-day show a shockingly morbid appetite – they look for portentous signs, for ghastly gleanings of fiery comets, the rushing up, with dire intimations of the 'northern lights,' and expect to see 'clouds of dark blood to blot the sun's broad light, / And angry meteors shroud the world in night.'" "

However much the eclipse disappointed, it served as metaphor and omen. Edward Everett, senator from Massachusetts, reported that "a motion was made in the House of Representatives to adjourn over till Monday in consequence of the darkness which was to prevail." The motion did not pass, and Everett quipped, "After sitting so frequently when there is darkness inside the House, it would be idle I think to fly before a little darkness on the face of the heavens." The United States Gazette, which feverishly opposed the re-election of President Andrew Jackson, joked that "the solar eclipse has not attracted as much attention here, as the late curious obscuration of one of the smaller stars in the constellation, Jupiter Jackson." With greater sobriety, the editor of the Philadelphia Gazette

observed that "the affairs of the Eastern hemisphere ... have reached a thrilling and portentous crisis. An irresistible spirit of reform seems burning with occult but mighty energy among the nations.... An eclipse in Europe at the present time might be considered as an omen. In this country, where it has lately occurred, the sunshine of regulated freedom appears alone to rest."

Unmoved by editorial, ministerial, astronomical, or political pronouncements and predictions, on the day of the eclipse some Philadelphians went ice-[skating](#). The coldest winter in decades had frozen the Delaware River, and thousands of citizens chose to pass the day in recreation. The Saturday Bulletin reported, "It is probable that fifteen thousand persons were amusing themselves by sliding and skating on the river, while the numerous booths, or travelling dram-shops which were located at short distances apart, throughout the whole city front, were observed to do a brisk business in hot punch, smoked sausages, crackers, and ten-for-a-cent cigars. Sober citizens, whom we have observed never exceed a regular dog-trot, while walking our streets, were now capering around with the agility of a feather in a whirlwind."

One artist drew the scene. On February 12, Edward William Clay set up his easel by the Delaware River and produced an image of citizens at play. Men of all classes slip and swirl, some into one another's arms, as they skate the day away. To the right, a rough-hewn citizen warms himself with a drink; a woman looks on contentedly. A black man, in stereotypical comic fashion, slides helplessly away, his hat lost. All is movement and motion, energy and action. But the sky is gray, the light is pale, and dusk is approaching.





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Louis P. Masur titled his book 1831: YEAR OF ECLIPSE: That's apparently short for 1831: YEAR OF THE ECLIPSED ECLIPSE. Now is somebody going to write a history book titled 1957: YEAR OF THE THIRD WORLD WAR THAT DIDN'T HAPPEN AS EXPECTED?

Although nothing whatever was visible to the naked eye at any point north of the Gulf Coast (where a brief minor "nibble" might possibly have been noted by some extraordinarily attentive observer), [Maria Mitchell](#), age 12, assisted her father in his attempts to use his amateur astronomical equipment to view the moon as it passed, invisible to the naked eye, close by but at no point touching upon the disk of the sun. Although it is of record that this attempt was made (they were attempting to determine the exact longitude of [Nantucket Island](#)), I very much doubt that—so close to the solar brilliance—they would have been able by the use of available instruments to make any readings at all.

Louis P. Masur to the contrary notwithstanding, here are the salient events that might have (but did not) create scholarly monographs entitled perhaps 1806: YEAR OF ECLIPSE or perhaps 1868: YEAR OF ECLIPSE:

Date	Type	Size	Length	Name
May 3, 1375 BCE	Total	1.029	02m05s	Ugarit Eclipse
June 5, 1302 BCE	Total	1.080	06m24s	Early Chinese Eclipse
April 16, 1178 BCE	Total	1.060	04m34s	Homer's "Odyssey"
April 20, 899 BCE	Annular	0.959	03m05s	China's "Double-Dawn" Eclipse
June 15, 763 BCE	Total	1.060	04m59s	Assyrian Eclipse
April 6, 648 BCE	Total	1.069	05m02s	Archilochus's Eclipse
May 28, 585 BCE	Total	1.080	06m05s	Herodotus/Thales Eclipse (Medes vs. Lydians)
May 19, 557 BCE	Total	1.026	02m22s	The Siege of Larisa
October 2, 480 BCE	Annular	0.932	07m58s	Xerxes's Eclipse
August 3, 431 BCE	Annular	0.984	01m04s	Peloponnesian War
March 21, 424 BCE	Annular	0.943	04m38s	8th Year of Peloponnesian War
November 24, 29 CE	Total	1.022	01m59s	Crucifixion of Christ?
March 19, 33 CE	Total	1.058	04m06s	Crucifixion of Christ?
April 30, 59 CE	Total	1.019	01m50s	Plinius's Eclipse
March 20, 71 CE	Hybrid	1.007	00m35s	Plutarch's Eclipse
June 6, 346 CE	Total	1.059	03m58s	no name
July 19, 418 CE	Total	1.046	03m52s	no name
November 24, 569 CE	Total	1.036	03m17s	Eclipse Preceding Birth of Mohammad
January 27, 632 CE	Annular	0.984	01m40s	Death of Mohammad's Son Ibrahim
December 7, 671 CE	Annular	0.924	10m18s	no name
May 5, 840 CE	Total	1.076	05m46s	Emperor Louis's Eclipse (Treaty of Verdun)
May 14, 1230	Total	1.060	03m17s	Major European Eclipse
May 3, 1715	Total	1.063	04m14s	Edmund Halley's Eclipse




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August 5, 1766	Annular	0.943	05m15s	Captain Cook's Eclipse
June 16, 1806	Total	1.060	04m55s	Tecumseh's Eclipse
August 18, 1868	Total	1.076	06m47s	King of Siam's Eclipse
July 29, 1878	Total	1.045	03m11s	Pike's Peak Eclipse
January 22, 1879	Annular	0.970	03m03s	Zulu War Eclipse
April 17, 1912	Hybrid	1.000	00m02s	The "Titanic" Eclipse
May 29, 1919	Total	1.072	06m51s	Einstein's Eclipse (Test of General Relativity)
January 24, 1925	Total	1.030	02m32s	NYC's Winter Morning Eclipse
August 31, 1932	Total	1.026	01m45s	Great Maine Eclipse



Mid-May: At about the midpoint of the month a quantity of dead and dry fish fell from the sky upon Futtehpur in [India](#).

 August 12, day: There was an obscurement of the sun which caused much alarm in America, and, from the “confession” of [Nat Turner](#) in his jail cell later in this year, we can now learn that his thinking had at that time been:




And by signs in the heavens that it would make known to me when I should commence the great work, and until the first sign appeared I should conceal it from the knowledge of men; and on the appearance of the sign, I should arise and prepare myself, and slay my enemies with their own weapons. And immediately on the sign appearing in the heavens, the seal was removed from my lips, and I communicated the great work laid out for me to do, to four in whom I had the greatest confidence (Henry, Hark, Nelson, and Sam).



This obscurement has been construed by generations of careless historian to have been an [eclipse](#).

It was no such animal. For three days the sun appeared, all the way from New York down into South Carolina, to have changed in color. This atmospheric disturbance, the “The Three Blue Days,” centered upon August 12th. Some of the superstitious white people of Philadelphia announced this to be “a sad augury of coming evil” and Turner was interpreting it as a black hand crossing the sun (“as the black spot passed over the sun, so shall the black pass over the earth”), while other persons reported that they believed they had seen in the heavens, emerging from “a long narrow (or serpentine) silvery colored belt,” the letters **G – O – D**.

The phenomenon had been caused by high altitude smoke given off by an immense forest fire in Canada.

(This sort of thing had happened before  and would happen again  and again. )

Why does it matter, whether the trigger event influencing the timing of the revolt had been a solar obscurement rather than an eclipse? Here is the reason. What had occurred was a one-time, quite mysterious event, which all across our nation in the absence of factual information received weird spontaneous explanation. To presume that the black man was so ignorant and sprang from such a deprived culture, that people like him would not have known what a solar eclipse was, and would therefore have been subject to such misunderstandings when one occurred, actually is of a piece with the 19th-Century story that when Turner’s body was rendered after his death, his skull was discovered to be as thick as that of a sheep. We should beware of the one story as we beware of the other, as not only unnecessary but also demeaning.

Nevertheless, here is the inaccurate manner in which this story is now being spread by non-scholars on the Internet:



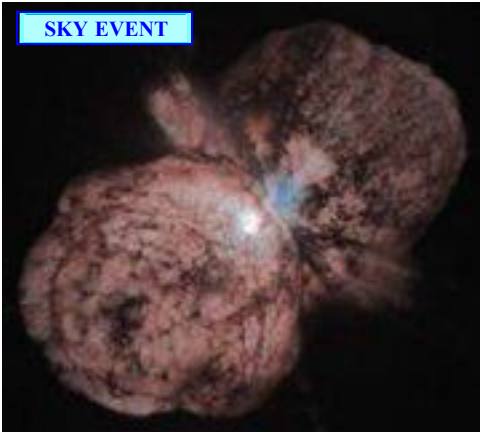
“The sign came in February 1831, with an eclipse of the sun. He told his closest comrades that the time of battle and blood was approaching. With him in the initial leadership cadre were four men: Henry Porter, Hark Travis, Nelson Williams, and Samuel Francis. Evidently there was a group of some 25 who would form the core of the fighting force at first, convinced that others would be recruited as the struggle was openly joined. The Fourth of July, that prime symbol of white American contradictions, was chosen as the date for the uprising. But as the time approached, Nat became ill (were there fears or premonitions?) and the date was abandoned. Another sign had to be sought. On August 13, 1831, there was ‘a day-long atmosphere phenomenon, during which the sun appeared bluish-green,’ and Nat knew that he had found the way again. One week later he met with Hark and Henry to agree on a final plan. The next night they met again, this time with several others; they agreed on their work, and ate a final meal together. ‘IT WAS PLAIN to me that the Savior was about to lay down the yoke he had borne for the sins of men, and the great day of judgment was at hand.’ —Nat Turner
In the dark hours of the morning of August 22, Nat Turner's God pressed him forward at the head of his band of black avenging angels, drove him in search of what seemed the ultimate justice: that ‘the first should be last and the last should be first.’“

There was no detectable eclipse of the sun noticeable at any point in Virginia or North Carolina at any time during February 1831. All that had happened was that a whole bunch of white Americans had been, in anticipation of an eclipse that was announced for February 12th, engaging in a whole lot of chitchat, which then on February 12th was radically disappointed. The solar eclipse that they had been anticipating had been an utter fizzle. There had been no darkening whatever. If this non-event of February 1831 had had any impact at all upon [Nat Turner](#), it would of necessity have needed to have come as his having heard white people chitchatting about their anticipations of the event they were predicting, as it could not possibly have come from his having actually observed anything in the sky — there having been nothing in the sky for him to have observed.

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1832

➡ Although Edmond Halley had cataloged the star Eta Carinae in 1677 as one of only the 4th magnitude, and during the early 19th century it had been a run-of-the-mill variable star, sometimes appearing at 4th magnitude, sometimes at 2d, in 1827 its brightness had briefly risen to 1st magnitude, and in this year, its brightness again increased to 1st magnitude. We can now use the Hubble Space Telescope to inspect what had been happening:



With Biela’s Comet scheduled for its first predicted return, a respected astronomer named H.W.M. Olbers inadvertently set off a public panic by announcing, accurately enough, that the head of the comet would pass through Earth’s orbit on October 29th. The newspapers sounded an alarm and then it took a concerted effort by pamphlet to educate the general public to the obvious fact: a comet’s passing through Earth’s orbit is not at all the same thing as a comet’s impacting upon Earth itself. The public was educated that, at its closest approach, this comet would be 90,000,000 kilometers away from us — and a “War Of The Worlds” panic was averted.

No.	Date.	Greenwich	Longitude			Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Direction.	Name of Computer.
		M. S. T. of Peri- helion Passage.	of Ascend- ing Node.	Longitude of Perihelion.	of Peri- helion.							
	A. D.	N. S.	° ' "	° ' "	° ' "	° ' "	° ' "			y.		
152	1830	Dec. 27.6604	338 9	2 311 15 14	26 53 48	44 45 30	0.1258874				R	Wolfers.
153	1832	Apr. 26.02156	72 41 47	228 10 41	204 31 6	43 18 3	1.183603				R	Bouvard.
B	1832	Nov. 26.11687	248 29 33	110 14 40	221 45 7	13 13 31	0.8790864	0.7514480		6.650	D	Baranowski.
154	1833	Sept. 10.024	322 49 58	221 30 38	158 40 40	7 26 17	0.44977				D	Peters.
											D	Peters.

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➡ March: The American Journal of Science reported that in this month there had fallen, in the fields of the village of Kourianof in Russia, “a combustible substance of a yellowish color, at least two inches thick, and covering a superficies of between six and seven hundred square feet.” This newfallen material appeared at first to the villagers to have the properties of cotton, but, when placed in water, the material burst into flames and then assumed the consistency of rosin. When warmed over a fire, this material boiled, “had the color of amber, was elastic like indian [sic] rubber, and smelt like prepared oil, mixed with wax.”

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**1833**

William Wells Brown would have been about 19 years of age during this year, so I am taking the liberty of introducing the following undated material from his NARRATIVE at this point, for lack of any more precise guidelines:

I WAS sent home, and was glad enough to leave the service of one who was tearing the husband from the wife, the child from the mother, and the sister from the brother – but a trial more severe and heart-rending than any which I had yet met with awaited me. My dear sister had been sold to a man who was going to Natchez, and was lying in jail awaiting the hour of his departure. She had expressed her determination to die, rather than go to the far south, and she was put in jail for safekeeping. I went to the jail the same day that I arrived, but as the jailer was not in I could not see her.

I went home to my master, in the country, and the first day after my return he came where I was at work, and spoke to me very politely. I knew from his appearance that something was the matter. After talking to me about my several journeys to New Orleans with Mr. Walker, he told me that he was hard pressed for money, and as he had sold my mother and all her children except me, he thought it would be better to sell me than any other one, and that as I had been used to living in the city, he thought it probable that I would prefer it to a country life. I raised up my head, and looked him full in the face. When my eyes caught his he immediately looked to the ground. After a short pause, I said,

"Master, mother has often told me that you are a near relative of mine, and I have often heard you admit the fact; and after you have hired me out, and received, as I once heard you say, nine hundred dollars for my service – after receiving this large sum, will you sell me to be carried to New Orleans or some other place?"

"No," said he, "I do not intend to sell you to a negro trader. If I had wished to have done that, I might have sold you to Mr. Walker for a large sum, but I would not sell you to a negro trader. You may go to the city, and find you a good master."

"But," said I, "I cannot find a good master in the whole city of St. Louis."

"Why?" said he.

"Because there are no good masters in the state."

"Do you not call me a good master?"

"If you were you would not sell me."

"Now I will give you one week to find a master in, and surely you can do it in that time."

The price set by my evangelical master upon my soul and body was the trifling sum of fine hundred dollars. I tried to enter into some arrangement by which I might purchase my freedom; but he would enter into no such arrangement.

I set out for the city with the understanding that I was to return in a week with some one to become my new master. Soon after reaching the city, I went to the jail, to learn if I could



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once more see my sister; but could not gain admission. I then went to mother, and learned from her that the owner of my sister intended to start for Natchez in a few days.

I went to the jail again the next day, and Mr. Simonds, the keeper, allowed me to see my sister for the last time. I cannot give a just description of the scene at that parting interview. Never, never can be erased from my heart the occurrences of that day! When I entered the room where she was, she was seated in one corner, alone. There were four other women in the same room, belonging to the same man. He had purchased them, he said, for his own use. She was seated with her face towards the door where I entered, yet she did not look up until I walked up to her. As soon as she observed me she sprang up, threw her arms around my neck, leaned her head upon my breast, and, without uttering a word, burst into tears. As soon as she recovered herself sufficiently to speak, she advised me to take mother, and try to get out of [slavery](#). She said there was no hope for herself – that she must live and die a slave. After giving her some advice, and taking from my finger a ring and placing it upon hers, I bade her farewell forever, and returned to my mother, and then and there made up my mind to leave for Canada as soon as possible.

I had been in the city nearly two days, and as I was to be absent only a week, I thought best to get on my journey as soon as possible. In conversing with mother, I found her unwilling to make the attempt to reach a land of liberty, but she counselled me to get my liberty if I could. She said, as all her children were in slavery, she did not wish to leave them. I could not bear the idea of leaving her among those [pirates](#), when there was a prospect of being able to get away from them. After much persuasion I succeeded in inducing her to make the attempt to get away.

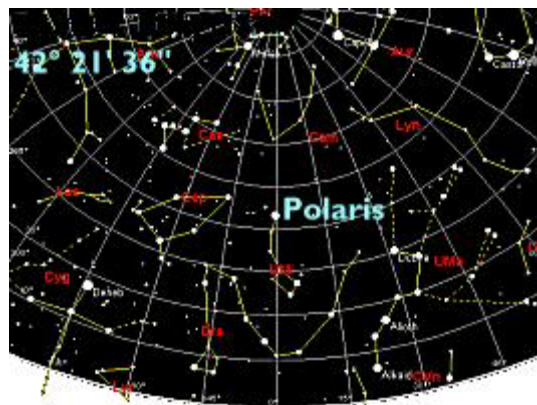
The time fixed for our departure was the next night. I had with me a little money that I had received, from time to time, from gentlemen for whom I had done errands. I took my scanty means and purchased some dried beef, crackers and cheese, which I carried to mother, who had provided herself with a bag to carry it in. I occasionally thought of my old master, and of my mission to the city to find a new one. I waited with the most intense anxiety for the appointed time to leave the land of slavery, in search of a land of liberty.

The time at length arrived, and we left the city just as the clock struck nine. We proceeded to the upper part of the city, where I had been two or three times during the day, and selected a skiff to carry us across the river. The boat was not mine, nor did I know to whom it did belong; neither did I care. The boat was fastened with a small pole, which, with the aid of a rail, I soon loosened from its moorings. After hunting round and finding a board to use as an oar, I turned to the city, and bidding it a long farewell, pushed off my boat. The current running very swift, we had not reached the middle of the stream before we were directly opposite the city.

We were soon upon the [Illinois](#) shore, and, leaping from the boat, turned it adrift, and the last I saw of it it was going down the river at good speed. We took the main road to Alton, and passed through just at daylight, when we made for the woods, where we

remained during the day. Our reason for going into the woods was, that we expected that Mr. Mansfield (the man who owned my mother) would start in pursuit of her as soon as he discovered that she was missing. He also new that I had been in the city looking for a new master, and we thought probably he would go out to my master's to see if he could find my mother, and in so doing, Dr. Young might be led to suspect that I had gone to Canada to find a purchaser.

We remained in the woods during the day, and as soon as darkness overshadowed the earth, we started again on our gloomy way, having no guide but the North Star. We continued to travel by



night, and secrete ourselves in the woods by day; and every night, before emerging from our hiding-place, we would anxiously look for our friend and leader – the North Star. And in the language of Pierpont we might have exclaimed,

“Star of the North! while blazing day
Pours round me its full tide of light,
And hides thy pale but faithful ray,
I, too, lie hid, and long for night.
For night; – I dare not walk at noon,
Nor dare I trust the faithless moon,
Nor faithless man, whose burning lust
For gold hath riveted my chain;
No other leader can I trust
But thee, of even the starry train;
For, all the host around thee burning,
Like faithless man, keep turning, turning.

In the dark top of southern pines
I nestled, when the driver's horn
Called to the field, in lengthening lines,
My fellows, at the break of morn.
And there I lay, till thy sweet face
Looked in upon my 'hiding place,'
Star of the North!
Thy light, that no poor slave deceiveth,
Shall set me free.”

As we travelled towards a land of liberty, my heart would at times leap for joy. At other times, being, as I was, almost constantly on my feet, I felt as though I could travel no further. But when I thought of slavery, with its democratic whips – its republican chains – its evangelical blood-hounds, and its religious slave-holders – when I thought of all this paraphernalia of American democracy and religion behind me, and



the prospect of liberty before me, I was encouraged to press forward, my heart was strengthened, and I forgot that I was tired or hungry.

On the eighth day of our journey, we had a very heavy rain, and in a few hours after it commenced we had not a dry thread upon our bodies. This made our journey still more unpleasant. On the tenth day, we found ourselves entirely destitute of provisions, and how to obtain any we could not tell. We finally resolved to stop at some farm-house, and try to get something to eat. We had no sooner determined to do this, than we went to a house, and asked them for some food. We were treated with great kindness, and they not only gave us something to eat, but gave us provisions to carry with us. They advised us to travel by day and lie by at night. Finding ourselves about one hundred and fifty miles from St. Louis, we concluded that it would be safe to travel by daylight, and did not leave the house until the next morning. We travelled on that day through a thickly settled country, and through one small village. Though we were fleeing from a land of oppression, our hearts were still there. My dear sister and two beloved brothers were behind us, and the idea of giving them up, and leaving them forever, made us feel sad. But with all this depression of heart, the thought that I should one day be free, and call my body my own, buoyed me up, and made my heart leap for joy. I had just been telling my mother how I should try to get employment as soon as we reached Canada, and how I intended to purchase us a little farm, and how I would earn money enough to buy sister and brothers, and how happy we would be in our own FREE HOME – when three men came up on horseback, and ordered us to stop.

I turned to the one who appeared to be the principal man, and asked him what he wanted. He said he had a warrant to take us up. The three immediately dismounted, and one took from his pocket a handbill, advertising us as runaways, and offering a reward of two hundred dollars for our apprehension and delivery in the city of St. Louis. The advertisement had been put out by Isaac Mansfield and John Young.

While they were reading the advertisement, mother looked me in the face, and burst into tears. A cold chill ran over me, and such a sensation I never experienced before, and I hope never to again. They took out a rope and tied me, and we were taken back about six miles, to the house of the individual who appeared to be the leader. We reached there about seven o'clock in the evening, had supper, and were separated for the night. Two men remained in the room during the night. Before the family retired to rest, they were all called together to attend prayers. The man who but a few hours before had bound my hands together with a strong cord, read a chapter from the Bible, and then offered up prayer, just as though God had sanctioned the act he had just committed upon a poor, panting, fugitive slave.

The next morning a blacksmith came in, and put a pair of handcuffs⁸¹ on me, and we started on our journey back to the land of whips, chains and Bibles. Mother was not tied, but was closely watched at night. We were carried back in a wagon, and after

81. It was apparently a rather ordinary practice to use iron handcuffs to subdue an unruly person of color. According to the journal of [Friend Thomas B. Hazard](#) or Hafsard or Hasard of [Kingston, Rhode Island](#), also known as “Nailer Tom,” at one point he was asked to fashion a pair of handcuffs with which to confine a crazy negress named Patience.



four days' travel, we came in sight of St. Louis. I cannot describe my feelings upon approaching the city.

As we were crossing the ferry, Mr. Wiggins, the owner of the ferry, came up to me, and inquired what I had been doing that I was in chains. He had not heard that I had run away. In a few minutes we were on the Missouri side, and were taken directly to the jail. On the way thither, I saw several of my friends, who gave me a nod of recognition as I passed them. After reaching the jail, we were locked up in different apartments.

I HAD been in jail but a short time when I heard that my master was sick, and nothing brought more joy to my heart than that intelligence. I prayed fervently for him – not for his recovery, but for his death. I knew he would be exasperated at having to pay for my apprehension, and knowing his cruelty, I feared him. While in jail, I learned that my sister Elizabeth, who was in prison when we left the city, had been carried off four days before our arrival.

I had been in jail but a few hours when three negro-traders, learning that I was secured thus for running away, came to my prison-house and looked at me, expecting that I would be offered for sale. Mr. Mansfield, the man who owned mother, came into the jail as soon as Mr. Jones, the man who arrested us, informed him that he had brought her back. He told her that he would not whip her, but would sell her to a negro-trader, or take her to New Orleans himself. After being in jail about one week, master sent a man to take me out of jail, and send me home. I was taken out and carried home, and the old man was well enough to sit up. He had me brought into the room where he was, and as I entered, he asked me where I had been? I told him I had acted according to his orders. He had told me to look for a master, and I had been to look for one. He answered that he did not tell me to go to Canada to look for a master. I told him that as I had served him faithfully, and had been the means of putting a number of hundreds of dollars into his pocket, I thought I had a right to my liberty. He said he had promised my father that I should not be sold to supply the New Orleans market, or he would sell me to a negro-trader.

I was ordered to go into the field to work, and was closely watched by the overseer during the day, and locked up at night. The overseer gave me a severe whipping on the second day that I was in the field. I had been at home but a short time, when master was able to ride to the city; and on his return he informed me that he had sold me to Samuel Willi, a merchant tailor. I knew Mr. Willi. I had lived with him three or four months some years before, when he hired me of my master.

Mr. Willi was not considered by his servants as a very bad man, nor was he the best of masters. I went to my new home, and found my new mistress very glad to see me. Mr. Willi owned two servants before he purchased me – Robert and Charlotte. Robert was an excellent white-washer, and hired his time from his master, paying him one dollar per day, besides taking care of himself. He was known in the city by the name of Bob Music. Charlotte was an old woman, who attended to the cooking, washing, &c. Mr. Willi was not a wealthy man, and did not feel able to keep many servants around his house; so he soon decided to hire me out, and as I had been accustomed to service in steamboats, he gave



me the privilege of finding such employment.

I soon secured a situation on board the steamer Otto, Capt. J.B. Hill, which sailed from St. Louis to Independence, Missouri. My former master, Dr. Young, did not let Mr. Willi know that I had run away, or he would not have permitted me to go on board a steamboat. The boat was not quite ready to commence running, and therefore I had to remain with Mr. Willi. But during this time, I had to undergo a trial for which I was entirely unprepared. My mother, who had been in jail since her return until the present time, was now about being carried to New Orleans, to die on a cotton, sugar, or rice plantation!

I had been several times to the jail, but could obtain no interview with her. I ascertained, however, the time the boat in which she was to embark would sail, and as I had not seen mother since her being thrown into prison, I felt anxious for the hour of sailing to come. At last, the day arrived when I was to see her for the first time after our painful separation, and, for aught that I knew, for the last time in this world!

At about ten o'clock in the morning I went on board of the boat, and found her there in company with fifty or sixty other slaves. She was chained to another woman. On seeing me, she immediately dropped her head upon her heaving bosom. She moved not, neither did she weep. Her emotions were too deep for tears. I approached, threw my arms around her neck, kissed her, and fell upon my knees, begging her forgiveness, for I thought myself to blame for her sad condition; for if I had not persuaded her to accompany me, she would not then have been in chains.

She finally raised her head, looked me in the face, (and such a look none but an angel can give!) and said, "My dear son, you are not to blame for my being here. You have done nothing more nor less than your duty. Do not, I pray you, weep for me. I cannot last long upon a cotton plantation. I feel that my heavenly Master will soon call me home, and then I shall be out of the hands of the slave-holders!"

I could bear no more — my heart struggled to free itself from the human form. In a moment she saw Mr. Mansfield coming toward that part of the boat, and she whispered into my ear, "My child, we must soon part to meet no more this side of the grave. You have ever said that you would not die a slave; that you would be a freeman. Now try to get your liberty! You will soon have no one to look after but yourself!" and just as she whispered the last sentence into my ear, Mansfield came up to me, and with an oath, said, "Leave here this instant; you have been the means of my losing one hundred dollars to get this wench back" — at the same time kicking me with a heavy pair of boots. As I left her, she gave one shriek, saying, "God be with you!" It was the last time that I saw her, and the last word I heard her utter. I walked on shore. The bell was tolling. The boat was about to start. I stood with a heavy heart, waiting to see her leave the wharf. As I thought of my mother, I could but feel that I had lost

—"the glory of my life,
My blessing and my pride!
I half forgot the name of slave,
When she was by my side."

The love of liberty that had been burning in my bosom had well-



nigh gone out. I felt as though I was ready to die. The boat moved gently from the wharf, and while she glided down the river, I realized that my mother was indeed

“Gone — gone — sold and gone,
To the rice swamp, dank and lone!”

After the boat was out of sight I returned home; but my thoughts were so absorbed in what I had witnessed, that I knew not what I was about half of the time. Night came, but it brought no sleep to my eyes. In a few days, the boat upon which I was to work being ready, I went on board to commence. This employment suited me better than living in the city, and I remained until the close of navigation; though it proved anything but pleasant. The captain was a drunken, profligate, hard-hearted creature, not knowing how to treat himself, or any other person.

The boat, on its second trip, brought down Mr. Walker, the man of whom I have spoken in a previous chapter, as hiring my time. He had between one and two hundred slaves, chained and manacled. Among them was a man that formerly belonged to my old master's brother, Aaron Young. His name was Solomon. He was a preacher, and belonged to the same church with his master. I was glad to see the old man. He wept like a child when he told me how he had been sold from his wife and children.

The boat carried down, while I remained on board, four or five gangs of slaves. Missouri, though a comparatively new state, is very much engaged in raising slaves to supply the southern market. In a former chapter, I have mentioned that I was once in the employ of a slave-trader, or driver, as he is called at the south. For fear that some may think that I have misrepresented a slave-driver, I will here give an extract from a paper published in a slave-holding state, Tennessee, called the “Millennial Trumpeter.”

“Droves of negroes, chained together in dozens and scores, and hand-cuffed, have been driven through our country in numbers far surpassing any previous year, and these vile slave-drivers and dealers are swarming like buzzards around a carrion. Through this county, you cannot pass a few miles in the great roads without having every feeling of humanity insulted and lacerated by this spectacle, nor can you go into any county or any neighborhood, scarcely, without seeing or hearing of some of these despicable creatures, called negro-drivers.

“Who is a negro-driver? One whose eyes dwell with delight on lacerated bodies of helpless men, women and children; whose soul feels diabolical raptures at the chains, and hand-cuffs, and cart-whips, for inflicting tortures on weeping mothers torn from helpless babes, and on husbands and wives torn asunder forever!”

Dark and revolting as is the picture here drawn, it is from the pen of one living in the midst of slavery. But though these men may cant about negro-drivers, and tell what despicable creatures they are, who is it, I ask, that supplies them with the human beings that they are tearing asunder? I answer, as far as I have



any knowledge of the state where I came from, that those who raise slaves for the market are to be found among all classes, from Thomas H. Benton down to the lowest political demagogue who may be able to purchase a woman for the purpose of raising stock, and from the doctor of divinity down to the most humble lay member in the church.

It was not uncommon in St. Louis to pass by an auction-stand, and behold a woman upon the auction-block, and hear the seller crying out, "How much is offered for this woman? She is a good cook, good washer, a good, obedient servant. She has got religion!" Why should this man tell the purchasers that she has religion? I answer, because in Missouri, and as far as I have any knowledge of slavery in the other states, the religious teaching consists in teaching the slave that he must never strike a white man; that God made him for a slave; and that, when whipped, he must not find fault – for the Bible says, "He that knoweth his master's will and doeth it not, shall be beaten with many stripes!" And slave-holders find such religion very profitable to them.

After leaving the steamer Otto, I resided at home, in Mr. Willi's family, and again began to lay plans for making my escape from slavery. The anxiety to be a freeman would not let me rest day or night. I would think of the northern cities that had heard so much about; – of Canada, where so many of my acquaintances had found a refuge. I would dream at night that I was in Canada, a freeman, and on waking in the morning, weep to find myself so sadly mistaken.

"I would think of Victoria's domain,
And in a moment I seemed to be there!
But the fear of being taken again,
Soon hurried me back to despair."

Mr. Willi treated me better than Dr. Young ever had; but instead of making me contented and happy, it only rendered me the more miserable, for it enabled me better to appreciate liberty. Mr. Willi was a man who loved money as most men do, and without looking for an opportunity to sell me, he found one in the offer of Captain Enoch Price, a steamboat owner and commission merchant, living in the city of St. Louis. Captain Price tendered seven hundred dollars, which was two hundred more than Mr. Willi had paid. He therefore thought best to accept the offer. I was wanted for a carriage driver, and Mrs. Price was very much pleased with the captain's bargain. His family consisted of himself, wife, one child, and three servants, besides myself, – one man and two women.

Mrs. Price was very proud of her servants, always keeping them well dressed, and as soon as I had been purchased, she resolved to have a new carriage. And soon one was procured, and all preparations were made for a turn-out in grand style, I being the driver.

One of the female servants was a girl some eighteen or twenty years of age, named Maria. Mrs. Price was very soon determined to have us united, if she could so arrange matters. She would often urge upon me the necessity of having a wife, saying that it would be so pleasant for me to take one in the same family! But getting married, while in slavery, was the last of my thoughts; and had I been ever so inclined, I should not have



ASTRONOMY

ASTRONOMY

married Maria, as my love had already gone in another quarter. Mrs. Price soon found out that her efforts at this match-making between Maria and myself would not prove successful. She also discovered (or thought she had) that I was rather partial to a girl named Eliza, who was owned by Dr. Mills. This induced her at once to endeavor the purchase of Eliza, so great was her desire to get me a wife!

Before making the attempt, however, she deemed it best to talk to me a little upon the subject of love, courtship, and marriage. Accordingly, one afternoon she called me into her room – telling me to take a chair and sit down. I did so, thinking it rather strange, for servants are not very often asked thus to sit down in the same room with the master or mistress. She said that she had found out that I did not care enough about Maria to marry her. I told her that was true. She then asked me if there was not a girl in the city that I loved. Well, now, this was coming into too close quarters with me! People, generally, don't like to tell their love stories to everybody that may think fit to ask about them, and it was so with me. But, after blushing a while and recovering myself, I told her that I did not want a wife. She then asked me if I did not think something of Eliza. I told her that I did. She then said that if I wished to marry Eliza, she would purchase her if she could.

I gave but little encouragement to this proposition, as I was determined to make another trial to get my liberty, and I knew that if I should have a wife, I should not be willing to leave her behind; and if I should attempt to bring her with me, the chances would be difficult for success. However, Eliza was purchased, and brought into the family.



Early in the year: Initial publication of what would become a bestselling textbook, *GEOGRAPHY OF THE HEAVENS* by [Elijah Hinsdale Burritt](#). The author had intended the title to be *URANOGRAPHY* but his publisher in Hartford, Connecticut refused to allow this.

ASTRONOMY



September: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

B	1832	Nov. 26.11687	248	29	33	110	14	40	221	45	7	13	13	31	0.8790894	0.7514160	D	Peters.
154	1833	Sept. 10.024	322	49	58	221	30	38	158	40	40	7	26	17	0.44977		D	Peters.
155	1834	April 2.821	226	14	41	276	40	13	50	25	32	5	59	48	0.51246		R	Rumker.
156	1835	May 20.875	20	8	30	595	91	57	918	45	23	9	2	42	2.05149			

SKY EVENT



November 12, Tuesday: Alyeksandr Porfiryevich Borodin was born in St. Petersburg, an illegitimate son of Prince Luka Stepanovich Gedianov (Gedianishvili) by Avdotya Konstantinovna Antonova, daughter of a soldier from Narva. According to common practice the infant was registered as the son of one of the Prince's serfs, Porfiry Ionovich Borodin.

This would be the night of the birth of meteor astronomy. With [David Henry Thoreau](#) 16 years old and [John Shepard Keyes](#) 12 years old, a spectacular [meteor](#) shower during the wee smalls of the early morning hours was witnessed by numerous observers at various places on the eastern seaboard of the North American continent. For four hours the pre-dawn sky was lit with meteors. We don't know that Henry himself saw it; presumably he was asleep, although there were newspaper reports that many people were awakened by the flashes of light cast on the walls of dark bedrooms by the fireballs, and in the towns many people were awakened by the shouts and cries of neighbors. Keyes would report that:

I slept in a chamber with an easterly window and happening by some unusual circumstance to be waked very early perhaps by the flashes of light I laid in bed for an hour or two watching and trying to count the bright streams of fire that shot so incessantly and madly across the sky. At last thoroughly roused by the sight I got up and pulling the bed clothes over my shoulders sat at the window till the day light hid the display. In my ignorance of the cause I almost concluded that the stars set or went out like that every morning and wondered I had never been told of it or seen it before. On coming down to breakfast I told the family that I saw hundreds of shooting stars that morning and was soundly taken to task for exaggeration, and scolded so that I held my tongue about it. But in a day or two when the accounts were in all the papers and everybodys mouth, I had an even worse scolding for not calling up the others to see the sight. It was grand splendid and magnificent beyond any thing I have ever seen since. The only picture I have ever seen that at all comes up to the scene is the one in the bulky volume of the one hundred memorable events of the first century of the U.S. It literally for all that hour or two rained stars with their long trails of sparks rocket like, in all directions across the heavens, mainly starting from a point in front of my window, and varying in sheer directions and colors to any extent.

J.S. KEYES AUTOBIOGRAPHY

The [United States Telegraph](#) of Washington DC suggested that "The strong southern wind of yesterday may have brought a body of electrified air, which, by the coldness of the morning, was caused to discharge its contents towards the earth." The Charleston [Courier](#) suggested that the sun had caused gases to be released from plants recently killed by frost. These gases, the most abundant of which was believed to be hydrogen, "became ignited by electricity or phosphoric particles in the air." Yale College's professor of natural philosophy, Denison Olmstead, however, in collecting and collating these various reports, would note that the apparent point of origin for these thousands upon thousands of streaks, regardless of the point of observation, had been a stationary radiant position in the neck of the constellation Leo. (This is why we now term them the Leonids, meaning "children of Leo.") A historian of Philadelphia would write the following description of the event:

The meteors of the 13th of November, 1833, were the most remarkable ever witnessed. A beholder says, he was sitting alone in a well lighted apartment at 4 AM., when he suddenly saw through

the window a shower of sparks falling past it on the outside. He supposed the house was on fire, and rushing to the door, to his extreme amazement, he found the entire atmosphere filled with flakes of fire, (for they fully resembled flakes of snow of a stellated or radiated form) of a pale rose red, seemingly of an inch diameter, falling in a vertical direction, as thick as he ever saw snow! Intermingled with the smaller stars, were a larger kind, equal to one in a hundred of the others, of an intense sapphire blue, seemingly of three to four inches diameter. This shower continued up to broad day light. They were seen all over the United States, and have been variously described, but all agreeing that they surpassed all other known cases.

SKY EVENT

A woodcut of the times, which would be recycled in color as below in Edmund Weiss's 1892 volume *BILDER-ATLAS DER STERNENWELT*, displays the sublime falling-star spectacle as it had been experienced above the magnificent sublime gloom and drifting sublime vapors of the [Niagara Falls](#).⁸²



The Reverend [William Miller](#) and his followers interpreted these falling stars as a sure sign of The End.

MILLENNIALISM

This display would lead to the first formulation of a theory on the origin of [meteors](#).

...a tempest of falling stars broke over the Earth.... The sky was scored in every direction with shining tracks and illuminated with majestic fireballs. At Boston, the frequency of meteors was estimated to be about half that of flakes of snow in an average snowstorm. Their numbers ... were quite beyond counting; but as it waned, a reckoning was attempted, from which it was computed, on the basis of that much-diminished rate, that 240,000 must have been visible during the nine hours they continued to fall.

82. Whether such a Leonid meteor shower is spectacular or not varies from year to year and from region to region. The best one of this century has come and gone in 1966, with up to 100,000 [meteors](#) an hour having been visible. The last chance of this millennium to see a potentially enticing Leonid will come in 1999, but to view this during the hours of darkness you will need to travel to Europe. If you miss it you'll need to wait another century or more for the next one expected to be spectacular, at least until the year 2098 and perhaps until the year 2131. Yep, it just ain't fair.



This Leonid storm was of course observed on the Great Plains by a number of bands of Dakota and appears in any number of “winter counts” painted on animal skin. Von Del Chamberlain of the Smithsonian has tabulated the astronomical references in 50 such Dakota records and found that 45 of the 50 made reference to the meteor shower of 1833/1834. The journal of Alexander M. Stephen records a meeting with Old Djasjini of the Hopi group on December 11, 1892. Old Djasjini is recorded as having said “How old am I? Fifty, maybe a hundred years, I can not tell. When I was a boy of so big (eight or ten years) there was a great comet in the sky and at night all the above was full of shooting stars — ah! that was a very long time ago, maybe a hundred years, maybe more.” During the probable lifetime of Old Djasjini there had been two such events which we know of, the great Leonid storm of 1833 followed by the sungrazing comet 1843 I. The Pawnee remember a Pahokatawa was of the opinion that when meteors were seen falling in great numbers it was not a sign that the world would end. Thus when the Pawnee witnessed the Leonid shower of 1833, when “the stars fell upon the earth,” they were able to say to one another “Remember Pahokatawa” and overcome their fear.

SKY EVENT

In this year, as in 1866 and in 1966, observers might see “waterfalls” of shooting stars flowing down all sides of their sky. There might well on occasion be more than 8,000 flashes per minute.

The Leonids of this year generated numerous accounts of meteors that made a swishing noise, meteors that made a whooshing noise — and one that “resembled the noise of a child’s pop-gun.”

1834

Robert Lucas Chance began to use a German process to produce finer quality and larger flat panes of glass. This was a cylinder sheet process. Such glass would be useful as an architectural material, as in the Crystal Palace. The process would be used extensively to make [glass windows](#) until early in the 20th Century. From this period onward industrial machines would be developed to automate the production first of obscured glass and then of clear window glass.



January: Yale College’s professor of natural philosophy, Denison Olmstead, made his report on the strange flashes and streaks in the sky during the pre-dawn hours of November 13, 1833. He noted that this phenomenon had not been observed in Europe. He also believed, falsely, that this phenomenon had not been observed west of Ohio, simply because it had not been reported farther west than Ohio **by white people**. He noted that the coordinates of the point of radiation in the constellation of Leo had been RA = 150 degrees, DEC = +20 degrees. (Professor A.C. Twining at West Point, New York estimated the radiant at RA = 148.4 degrees, DEC = +22.3 degrees and W. E. Aiken of Emmitsburg, Maryland estimated the radiant at RA = 148.2 degrees, DEC = +23.8 degrees.) Professor Olmstead theorized correctly that the [meteors](#) had originated from a swarm of particles in space, although he failed to associate this swarm of particles with a disintegrating comet.

Eventually it would be noted that at Cumana, South America on the night of November 12, 1799, F.H.A. Humboldt had made an observation of similar thousands of bright meteors, and that other similar observations had been made from the Equator to Greenland. When, during November 1834, the swarm would reappear and would again come out of the constellation Leo, it would become apparent that this was an annual phenomenon although the intensity of the swarm had been varying from year to year. By 1837, Heinrich Wilhelm Matthias Olbers would be able to combine the available data and establish that the Leonid swarm had a period of 33 or 34 years, and would be able to accurately predict a strong return during November 1867.

SKY EVENT



ASTRONOMY

ASTRONOMY



April: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

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156	1835	May 20.68795	50	8	30	395	91	57	919	46	33	9	2	42	2.05149			

SKY EVENT



May 26, Monday: A multi-plate series of Daguerreotypes was made, by William and Frederick Langenheim, of an [eclipse](#) of the sun.

SKY EVENT



August 8, Friday: After observing a spectacular [meteor](#) shower, Professor John Locke (1792-1856) of Ohio Medical College reported that all the streaks of light had seemed to be originating from a point near the star Algol in the constellation Perseus. –But the annual nature of this August phenomenon, the Perseid shower, would not become clear for some years.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

6th day was the General School committee Many of the committee attended. among them was our dear friends Edw & Elizabeth Wing who left in the Afternoon, for Elizabeth to finish her family visit in [Greenwich](#) Monthly Meeting –

RELIGIOUS SOCIETY OF FRIENDS



November 30, Sunday: There was a total [eclipse](#) of the sun (#7251) from Alaska to Virginia.

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

1st day 11th M 30th 1834 / Attended our Meetings in [Newport](#) – In the Morning Father Rodman was engaged in testimony & supplication & in the Afternoon in testimony – The Meetings were well attended and there seems some encouragement to hold on & endeavour to keep up our Meetings – for tho' they are much smaller & changed from what they were in the early part of my life, yet it seems as if there was some life remaining & yet solid attenders. –

RELIGIOUS SOCIETY OF FRIENDS

1835



George Airy of England calculated the form of the diffraction pattern produced by a circular aperture.

HISTORY OF OPTICS



ASTRONOMY

ASTRONOMY



ASTRONOMY

ASTRONOMY



January: In the border South, in [Maryland](#), the slave Freddy Bailey (Frederick Douglass) began to work for Mr. William Freeland, on contract by his owner for this entire year of 1835. Freeland would turn out to be the best master Douglass ever had — until, that is, –as he would later phrase the matter– he was able to become



his own master.

Frederick Douglass's NARRATIVE

I began ... to prepare myself for a final struggle, which should decide my fate one way or the other. My tendency was upward. I was fast approaching manhood, and year after year had passed, and I was still a slave. These thoughts roused me – I must do something. I therefore resolved that 1835 should not pass without witnessing an attempt, on my part, to secure my liberty. But I was not willing to cherish this determination alone. My fellow-slaves were dear to me. I was anxious to have them participate with me in this, my life-giving determination. I therefore, though with great prudence, commenced early to ascertain their views and feelings in regard to their condition, and to imbue their minds with thoughts of freedom. I bent myself to devising ways and means for our escape, and meanwhile strove, on all fitting occasions, to impress them with the gross fraud and inhumanity of slavery. I went first to Henry, next to John, then to the others. I found, in them all, warm hearts and noble spirits. They were ready to hear, and ready to act when a feasible plan should be proposed. This was what I wanted. I talked to them of our want of manhood, if we submitted to our enslavement without at least one noble effort to be free. We met often, and consulted frequently, and told our hopes and fears, recounted the difficulties, real and imagined, which we should be called on to meet. At times we were almost disposed to give up, and try to content ourselves with our wretched lot; at others, we were firm and unbending in our determination to go. Whenever we suggested any plan, there was shrinking – the odds were fearful. Our path was beset with the greatest obstacles; and if we succeeded in gaining the end of it, our right to be free was yet questionable – we were yet liable to be returned to bondage. We could see no spot, this side of the ocean, where we could be free. We knew nothing about Canada. Our knowledge of the north did not extend farther than New York; and to go there, and be forever harassed with the frightful liability of being returned to slavery –with the certainty of being treated tenfold worse than before– the thought was truly a horrible one, and one which it was not easy to overcome. The case sometimes stood thus: At every gate through which we were to pass, we saw a watchman –at every ferry a guard –on every bridge a sentinel – and in every wood a patrol. We were hemmed in upon every side. Here were the difficulties, real or imagined – the good to be sought, and the evil to be shunned. On the one hand, there stood slavery, a stern reality, glaring frightfully upon us, – its robes already crimsoned with the blood of millions, and even now feasting itself greedily upon our own flesh. On the other hand, away back in the dim distance, under the flickering light of the north star, behind some craggy hill or snow-covered mountain, stood a doubtful freedom –half frozen– beckoning us to come and share its hospitality. This in itself was sometimes enough to stagger us; but when we permitted ourselves to survey the road, we were frequently appalled. Upon either side we saw grim death, assuming the most horrid shapes. Now it was starvation, causing us to eat our own flesh; –now we were contending with the waves, and were drowned; –now we were overtaken, and torn to pieces by the fangs of the terrible bloodhound.

[NARRATIVE](#)
[NORTH STAR](#)

**Frederick Douglass's NARRATIVE**

We were stung by scorpions, chased by wild beasts, bitten by snakes, and finally, after having nearly reached the desired spot, –after swimming rivers, encountering wild beasts, sleeping in the woods, suffering hunger and nakedness,– we were overtaken by our pursuers, and, in our resistance, we were shot dead upon the spot! I say, this picture sometimes appalled us, and made us

“rather bear those ills we had,
Than fly to others, that we knew not of.”

In coming to a fixed determination to run away, we did more than Patrick Henry, when he resolved upon liberty or death. With us it was a doubtful liberty at most, and almost certain death if we failed. For my part, I should prefer death to hopeless bondage.

While working for Mr. Freeland, Douglass would even be allowed to form that clandestine Sunday School project of his, and teach reading to some 20 to 40 other slaves. What Christian liberality! What enlightened generosity!

At some point during this time period, Douglass was able to find out approximately how old he was. His owner Thomas Auld had let this piece of information slip within the hearing of the teenage Freddy:

Frederick Douglass's NARRATIVE

I have no accurate knowledge of my age, never having seen any authentic record containing it. By far the largest part of the slaves know as little of their ages as horses know of theirs, and it is the wish of most masters within my knowledge to keep their slaves thus ignorant. I do not remember to have ever met a slave who could tell of his birthday, they seldom come nearer to it than planting-time, harvest-time, cherry-time, spring-time, or fall-time. A want of information concerning my own was a source of unhappiness to me even during childhood. The white children could tell their ages. I could not tell why I ought to be deprived of the same privilege. I was not allowed to make any inquiries of my master concerning it. He deemed such inquiries on the part of a slave improper and impertinent, and evidence of a restless spirit. The nearest estimate I can give makes me now between twenty-seven and twenty-eight years of age. I come to this, from hearing my master say, some time during 1835, I was about seventeen years old...

Thomas Auld, who had let this piece of information slip within the hearing of the teenage Frederick Douglass, having hired him out to toil in the fields of William Freeland. Douglass used his laboriously acquired knowledge of language to compose passes or “protections” for himself and a number of other field laborers. Here Douglass later reconstructs the substance of what he had written in these “protections,” despite the fact that upon the failure of his escape plan all copies of the “protections” had been destroyed by the slaves:



"This is to certify that I, the undersigned, have given the bearer, my servant, full liberty to go to Baltimore, and spend the Easter holidays. Written with mine own hand, &c., 1835.

"WILLIAM HAMILTON,

"Near St. Michael's, in Talbot county, Maryland."



March: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

155	1834	April	2821	226	14	41	276	40	13	50	25	32	5	59	48	0.51246	R	Rumker.		
156	1835	Mar.	30.68738	59	8	30	206	21	57	212	46	33	9	2	42	2.05149	R	W. Bessel.		
			27.57651	58	32	23	207	55	33	210	36	50	9	7	39	2.041308	R	Santini.		
H	1835	Nov.	15.94153	55	21	41	304	42	17	110	39	24	17	45	35	0.5863639	0.9674023	76.290	D	Lundhal.
157	1840	Jan.	4.47112	190	6	15	192	90	38	79	14	93	53	5	41	0.6184594				

SKY EVENT



July 17, Friday: On November 21, 1783, in a garden in the Bois de Boulogne, the Frenchmen Joseph-Michel and Jacques-Etienne Montgolfier had ascended into the skies in a hot-air balloon for a period of 26 minutes. But things they had been a-changing. So, when during this year of 1835 a French gunboat received orders to shoot down a hostile hot-air balloon — it would be discovered that what it had been ordered to shoot down was instead the planet Venus. Also, in this year of 1835 John Wise rode by balloon from Philadelphia to Haddonfield, New Jersey, a distance of some 9 miles. (“Now to figure out how to steer this thing.”) And, on this date in this year, the citizens of Boston got involved in the rage of the age, as their goldbeater Louis Lauriat made his first ascents.

The Reverend [Henry C. Wright](#) paid \$15 to become a life member of the Massachusetts Anti-Slavery Society. He borrowed a volume of Blackstone from the Boston lawyer [David Lee Child](#) in order to read up on the law of Theft, with the objective of ascertaining what was the legal definition for human slavery. (He wouldn’t find much in the book that was helpful —of course— and would settle on a definition of slavery as consisting in involuntary and uncompensated labor — a definition which could only be described as “personal” as it would to this day never be codified either in federal jurisprudence or in federal legislation.)



August 25, Tuesday: Benjamin Day’s New-York [Sun](#) announced that Sir John Herschel, using a remarkable new English [telescope](#) seven times more powerful than anything previously devised, had been able to look at the surface of the moon as if he were viewing with the unaided eye from a distance of only one hundred yards. Over the following three days the [Sun](#) would be presenting a series of articles, allegedly reprinted from the Edinburgh [Journal of Science](#) (a reputable journal which had some time before suspended publication), detailing Sir John’s alleged sightings, up to and including moon creatures who appeared to be shaped like terrestrial beavers, who were walking upright, carrying their young in their arms, heating their dwellings by fire, etc., etc. In fact Sir John Herschel, eminent British astronomer, indeed had in January 1834 gone to Cape Town on the Cape of Good Hope to try out a new type of powerful telescope. On this day the newspaper was able to print and vend an unprecedented 15,000 copies.

In [Illinois](#), Ann Rutledge, Abraham Lincoln’s love interest, died from fever at the age of 22.



August 28: Benjamin Day's New-York Sun ran the fourth and last installment of its moon hoax announcing that Sir John Herschel was sighting, on the moon through his new telescope, furry, winged creatures resembling giant bats — and Day was able to print and vend an unprecedented 19,360 copies of his newspaper:

We counted three parties of these creatures, of twelve, nine and fifteen in each, walking erect towards a small wood... Certainly they were like human beings, for their wings had now disappeared and their attitude in walking was both erect and dignified... About half of the first party had passed beyond our canvas; but of all the others we had perfectly distinct and deliberate view. They averaged four feet in height, were covered, except on the face, with short and glossy copper-colored hair, and had wings composed of a thin membrane, without hair, lying snugly upon their backs from the top of the shoulders to the calves of their legs.

The face, which was of a yellowish color, was an improvement upon that of the large orangutan... so much so that but for their long wings they would look as well on a parade ground as some of the old cockney militia. The hair of the head was a darker color than that of the body, closely curled but apparently not woolly, and arranged in two circles over the temples of the forehead. Their feet could only be seen as they were alternately lifted in walking; but from what we could see of them in so transient a view they appeared thin and very protuberant at the heel... We could perceive that their wings possessed great expansion and were similar in structure of those of the bat, being a semitransparent membrane expanded in curvilinear divisions by means of straight radii, united at the back by dorsal integuments. But what astonished us most was the circumstance of this membrane being continued from the shoulders to the legs, united all the way down, though gradually decreasing in width. The wings seemed completely under the command of volition, for those of the creatures whom we saw bathing in the water spread them instantly to their full width, waved them as ducks do theirs to shake off the water, and then as instantly closed them again in a compact form.

The Sun having become the newspaper with the largest circulation in the world, later stories would tell of a sapphire Temple of the Moon with a yellow roof resembling gold, supported on pillars seventy feet high and six feet thick. Then the newspaper would announce that, unfortunately, the new telescope had been left facing the east and that the rays of the sun, concentrated through the lenses, had burned a hole "15 feet in circumference" entirely through the reflecting chamber — quite putting the observatory out of commission.



September 1, Tuesday: Elijah Hinsdale Burritt, A.M.'s ATLAS, DESIGNED TO ILLUSTRATE THE GEOGRAPHY OF THE HEAVENS, COMPRISING THE FOLLOWING MAPS OR PLATES.... (New York: Published by F.J. Huntington and Co. 174 Pearl Street. Hand-colored copper engravings by W.G. Evans of New-York. This was accompanied by a 2d edition of the author's GEOGRAPHY OF THE HEAVENS.)

ASTRONOMY

In Newport, Rhode Island, Friend Stephen Wanton Gould wrote in his journal:

3rd 9th M 1st 1835 / This Morning went on board the President for Providence to attend the Meeting of the Sub-Committee & arrived at the School House a few minutes after the business of




ASTRONOMY

ASTRONOMY

*the Meeting had commenced
We had two laborious sittings as it appeared there was trouble
in the Camp - I went down to [Moses Browns](#) & lodged - In the
Morning of the 2nd inst word came that another Meeting of the
committee was requested & those of us at M Brownss were desired
to be at the School House to which we soon repaired & had two
long settings & at 4 OClock I left them & returned in the
President to [Newport](#). -*

RELIGIOUS SOCIETY OF FRIENDS



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 September 16, Wednesday: The New-York [Sun](#) admitted that its [moon](#) stories were a hoax. (Richard Adams Locke would confess his authorship. [Harriet Martineau](#) would report, in her RETROSPECT OF WESTERN TRAVEL, that a missionary society of Springfield MA had resolved to send missionaries to convert and civilize these bat men of the moon.)

ASTRONOMY

Records of the "[Institute of 1770](#)":

*"Whether the banishment of Napoleon to St. Helena was
justifiable?"*

 October: Regular as clockwork, the return of the comet which had been observed by the Reverends Increase Mather and [Cotton Mather](#) through [Harvard College](#)'s "3 foote and a halfe with a concave ey-glasse" reflecting [telescope](#) in 1682,  the comet which is known as "Halley's" to commoners and as "P/Halley" to others.



Halley has caught the attention of mankind so often because only it has long durations of visibility, **and** great brightness outside twilight and often at large elongations from the sun, **and** only brief interruptions of visibility by the sun's glare, **and** occasional spectacular approaches to the earth For all this to be possible its natural adequate brightness is requisite but not sufficient (some of its comrades may have more of it); the real key is a combination, unique to it, of orbital features.

HARVARD OBSERVATORY

It would be during this appearance of [Halley's Comet](#) that it would first be hypothesized that the outgassing from comets must be shoving them around, perturbing their orbital motion, and also, Newton to the contrary notwithstanding, causing them to lose mass toward their eventual disintegration.⁸³

This time, [Maria Mitchell](#) and her father recorded the movements of this periodic comet.

83. All the initial calculations of the magnitude and directionality of this phenomenon, however, would prove to have been way, way off.



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY

This magazine illustration would undoubtedly have been somewhat exaggerated:



ASTRONOMY

ASTRONOMY



October 15, Thursday: [Richard Henry Dana, Jr.](#) reminisced with old buddies (a favorite passtime of his: we could utilize him as the type case of homosociality) from the days of the “hide crew” who lived ashore in San Diego.

AND NOW, FOR SOMETHING ENTIRELY DIFFERENT, A REPORT FROM OUR SAILOR:

Thursday, Oct. 15th. Found here the Italian ship *La Rosa*, from the windward, which reported the brig *Pilgrim* at San Francisco, all well. Everything was as quiet here as usual. We discharged our hides, horns, and tallow, and were ready to sail again on the following Sunday. I went ashore to my old quarters, and found the gang at the hide-house going on in the even tenor of their way, and spent an hour or two, after dark, at the oven, taking a whiff with my old Kanaka friends, who really seemed glad to see me again, and saluted me as the Aikane of the Kanakas. I was grieved to find that my poor dog Bravo was dead. He had sickened and died suddenly, the very day after I sailed in the *Alert*.



During this period [Halley's Comet](#) was appearing 60 degrees north of the sun. Because of its positioning this time, it would be visible all night every night crossing the northern sky. Its tail would grow to 30 degrees.

SKY EVENT



October 27, Tuesday: Records of the [“Institute of 1770”](#):

Lecture on “[Astronomy](#).” Debated: “Should the people ever inflict punishment upon an individual without granting him a regular trial?”

HARVARD COLLEGE



ASTRONOMY

ASTRONOMY



October 29, Thursday: This was the night on which the famous Tammany fringe political meeting occurred in New-York, at which as a prank pro-administration forces turned off the gaslight, and the assembled citizens were forced to light and hold up the “locofoco” friction match of the period in order to continue (then they also found themselves some candles). Conservative Democrats of New York State would begin to refer derisively to a fringe branch of their party, the Radical Democrats, as “locofocos,” because of this prank at this meeting. This term of abuse would be picked up by the Whigs and generalized to mean any Democrat.

In about this time frame, in New-York, the three Hecker brothers, including [Isaac Hecker](#), were becoming active “Loco-Focos,” that is, they were affiliating politically with the Radical Democrats who opposed not only the state banks but also the Bank of the United States, and condemned the issuance of a paper currency. This, in the period, was considered to be Jeffersonianism.

THE SCARLET LETTER: Furthermore, on the left hand as you enter the front door, is a certain room or office, about fifteen feet square, and of a lofty height, with two of its arched windows commanding a view of the aforesaid dilapidated wharf, and the third looking across a narrow lane, and along a portion of Derby Street. All three give glimpses of the shops of grocers, block-makers, slop-sellers, and ship-chandlers, around the doors of which are generally to be seen, laughing and gossiping, clusters of old salts, and such other wharf-rats as haunt the Wapping of a seaport. The room itself is cobwebbed, and dingy with old paint; its floor is strewn with grey sand, in a fashion that has elsewhere fallen into long disuse; and it is easy to conclude, from the general slovenliness of the place, that this is a sanctuary into which womankind, with her tools of magic, the broom and mop, has very infrequent access. In the way of furniture, there is a stove with a voluminous funnel; an old pine desk with a three-legged stool beside it; two or three wooden-bottom chairs, exceedingly decrepit and infirm; and - not to forget the library - on some shelves, a score or two of volumes of the Acts of Congress, and a bulky Digest of the Revenue laws. A tin pipe ascends through the ceiling, and forms a medium of vocal communication with other parts of the edifice. And here, some six months ago - pacing from corner to corner, or lounging on the long-legged stool, with his elbow on the desk, and his eyes wandering up and down the columns of the morning newspaper - you might have recognised, honoured reader, the same individual who welcomed you into his cheery little study, where the sunshine glimmered so pleasantly through the willow branches on the western side of the Old Manse. But now, should you go thither to seek him, you would inquire in vain for the Locofoco Surveyor. The besom of reform hath swept him out of office, and a worthier successor wears his dignity and pockets his emoluments.

As [Halley's Comet](#) plunged toward the skies of the Southern Hemisphere on its way in toward the sun, it was coming within the view of Sir John Herschel at his station in South Africa.

SKY EVENT



ASTRONOMY

ASTRONOMY



November 16, Monday: [Halley's Comet](#) whipped around the sun and was, for more than a week, lost to view.⁸⁴

SKY EVENT

Friend [Stephen Wanton Gould](#) wrote in his journal:

2nd day 16th of 11th M / Thos Anthony has spent a little time with us this morning but has gone to Wm Nichols's to dine by invitation The Wind being high, he could not get up the River & lodged again with us. —

RELIGIOUS SOCIETY OF FRIENDS

1836



MAPPA SELENOGRAPHICA, a map of the [moon](#), was produced by Wilhelm Beer (1797-1850) and Johann Heinrich von Madler (1794-1874). These astronomers would also be the 1st to map Mars.

3d edition of [Elijah Hinsdale Burritt](#)'s GEOGRAPHY OF THE HEAVENS, with a preamble "Advantages of the Study of [Astronomy](#)" by Dr. Thomas Dick. To this edition Professor Olmsted of Yale College contributed a brief article, "Meteoric Showers." At this juncture the book was stereotyped for ready reprinting and its illustrations, which had been engraved on copper, were re-cut on steel.

84. "P/HALLEY, (1P=1835 III). Viewed with the unaided eye from September 23 until February 18th, T=1835 November 16. First detected without optical aid on September 23 when situated in the morning sky in eastern Auriga. Moved swiftly to the northeast. By October 5 already 3rd magnitude. Beginning October 8, visible all night as a 1-2 magnitude object in Ursa Major. Passed through solar conjunction far north of the Sun, entering the evening sky. On October 14 located in northernmost Bootes, 1st magnitude with a 20 degree tail. By October 20 situated in Ophiuchus, magnitude 1-2 and still with an impressive tail. In the first half of November about 2nd magnitude, drifting slowly to the southwest and then entering the evening twilight. Following solar conjunction reported as about 2nd magnitude at the very end of January 1836 — about 30-50 times brighter than expected! Comet situated a little southwest of Antares. Throughout the first half of February seen as a steadily fading naked eye object." According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

155	1834	April	2.821	226	14	41	276	40	13	50	25	32	5	59	48	0.51246	R	Rumker.
156	1835	Mar.	30.68738	59	8	30	206	21	57	212	46	33	9	2	42	2.05149	R	W. Bessel.
			27.57651	58	32	23	207	55	33	210	36	50	9	7	39	2.041308	R	Santini.
H	1835	Nov.	15.94153	55	21	41	304	42	17	110	39	24	17	45	35	0.5863639	D	Lundhal.
157	1840	Jan.	4.47112	190	6	15	162	80	38	72	14	93	53	5	41	0.6184594		

ASTRONOMY

ASTRONOMY



January 1: During this general period [Halley's Comet](#) was in the constellation of Scorpius. As the comet would recede in the heavens, Sir John Herschel from his South Africa location would be well positioned to observe and sketch an entirely unexpected and most blazing amazing display. As the comet fled, Frederick Douglass made a new years resolution:

SKY EVENT

**“By this date
next year
I will be
a free man!”**



[Friend Stephen Wanton Gould](#) wrote in his journal, mentioning that he was in the process of writing to [Friend Moses Brown](#):

6th day 1st of 1st M 1836 / It has been a pleasant day as to the outward, & norm [?] in the inward to render it otherwise -called in the Afternoon to visit my cousins Henry & Thos Gould in their respective Mills - & this evening wrote a letter to my dear Ancient friend [Moses Brown](#).⁸⁵

85. Stephen Wanton Gould Diary, 1833-1838: The Gould family papers are stored under control number 2033 at the Division of Rare and Manuscript Collections of Cornell University Library, Box 9 Folder 15: January 1, 1833-August 28, 1836; Box 9 Folder 16: September 1, 1836-September 20, 1838; also on microfilm, see Series 7



ASTRONOMY

ASTRONOMY



Last week in January: During the last week in January [Halley's Comet](#) rose away from the sun and past the earth and arrived at about the orbit of Mars. Suddenly there was a magnificent outburst and the comet began sending out an expanding halo. With its tail no longer visible even by [telescope](#), this halo was dramatic, and could be watched as within about three weeks it would expand to at least a million miles in diameter. Sir John Herschel would write of the expanding halo as resembling “a transparent gauze or alabaster vase illuminated from within.” (It has been suggested that such a surge as this [comet](#) exhibited in 1836 may also have happened in 607 CE, 1066 CE, and 1145 CE, due to some volatile spot on the body of the comet that was becoming turned toward the sun at this precise point between 63 and 77 days after perihelion.)

SKY EVENT

ASTRONOMY

ASTRONOMY



February 2, Tuesday: By a decree of the government, Gaetano Donizetti was made a chevalier of the French Legion of Honor.

Defeated as a delegate to the Constitutional Convention from his home town of Nacogdoches, [Sam Houston](#) was elected from the Refugio District.

TEXAS

At the Alamo, Colonel James Bowie and Neill vowed that they would “rather die in these ditches than give it up to the enemy.” (Were not these defenders noticing the strange glowing ball of the departing [Halley's Comet](#) in the southern skies, and wondering what this [comet](#) had tried to tell them?)

SKY EVENT



ASTRONOMY

ASTRONOMY


Lieutenant Colonel William B. Travis arrived at the Alamo with 30 brave, self-sacrificing white men.



March 26, Saturday: At the Theatre de la Bourse in Paris, Daniel-Francois-Esprit Auber's opera comique Les chaperons blanc to words of Scribe was performed for the initial time.

ASTRONOMY

ASTRONOMY

 May 15, Sunday: There was an annular [eclipse](#) of the sun (#7254) visible on this day at the tip of Florida. The [astronomer Francis Bailey](#), viewing from southern Scotland where the eclipse was more total, witnessed light from the limb of the sun shining like a string of beads though the valleys on the limb of the moon — “Bailey’s Beads” was quite a sight.




1836 May 15 14:02 A 135 0.470 0.951 45.1N 44.4W 62 203 04m47s

Back in 1824 at [Harvard College](#), [Edward Bliss Emerson](#)’s exercise in mathematics (25 ¾ x 38 ¾ in., Thesis #285, HUC 8782.514) had consisted of a calculation and projection predicting the path across the face of the earth of the shadow of a solar eclipse that would be occurring during May 1836. Question: was this the one? Another question: how accurate did this undergraduate’s mathematical projection turn out to be?

Friend [Stephen Wanton Gould](#) wrote in his journal:

1st day 15th of 5th M 1836 / We did not attend Meeting this Morning as Aunt Stantons funeral was to be spoken of in my name -Attended the funeral at 1 OC at the house which was a silent & Serious setting the funeral was got through with in season, for us to attend the Afternoon Meeting which was silent & pretty good time. -

RELIGIOUS SOCIETY OF FRIENDS

 May 20, Friday: [Thomas Jefferson](#)’s [Monticello](#) went back onto the Virginia real estate market. This time the mansion would be purchased for merely \$2,500 by Lieutenant Levy of the US Navy. A bachelor from Philadelphia, [Uriah Phillips Levy](#) was the only Jewish officer in our entire navy and regarded the former home of the former president who had expressed a belief in freedom of belief with a great deal of veneration. He was, therefore, the ideal person to own Monticello. If anybody could save the place, a persistent fellow like him could.

At this point [Halley’s Comet](#), which had been invisible to the naked eye since late March, was fading out — even for Sir John Herschel still watching it faithfully through his [telescope](#) in South Africa.

SKY EVENT



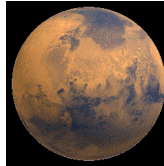
ASTRONOMY

ASTRONOMY

1837



Observations of the north polar cap of a globe hanging in space, [Mars](#), were indicating the dark area surrounding this polar cap to be of unequal width and not everywhere equally dark.



ASTRONOMY

ASTRONOMY

ASTRONOMY



The Reverend [William Kirby](#)'s ON THE POWER, WISDOM AND GOODNESS OF GOD AS MANIFESTED IN THE CREATION OF ANIMALS AND IN THEIR HISTORY, HABITS AND INSTINCTS; (Second American Edition. Philadelphia: Carey, Lea & Blanchard).

ON THE POWER, WISDOM, ...

ON THE POWER, WISDOM, ...

A copy of this was gifted to [Harvard College](#) by the Class of 1837 on 31 July, 1837.



There had been hardly enough at [Harvard](#) during those years to set a student scheming about other worlds to interrogate. However, during this final year in college would be published John Pringle Nichol's VIEWS OF THE ARCHITECTURE OF THE HEAVENS, the book that was currently inspiring [Robert Chambers](#) to begin the

ASTRONOMY

ASTRONOMY

drafting of his phenomenal bestseller, [VESTIGES OF THE NATURAL HISTORY OF CREATION](#).



Soon Professor William Whewell, in his HISTORY OF THE INDUCTIVE SCIENCES, FROM THE EARLIEST TO THE PRESENT TIME, would be indicting a couple of guys who were clearly guilty of living in late Roman times, Lactantius and Cosmas Indicopleustes, as guilty also of belief in a flat earth.



During the period of [David Henry Thoreau](#)'s residency in Harvard Yard, according to a later record made by Professor Joseph Lovering,

the College did not possess a single instrument which was adapted to making an astronomical observation which would have any scientific value.

HARVARD OBSERVATORY

there having been merely one unreliable astronomical clock, one small and quite useless transit compass "far below the average of such instruments," and three telescopes not appropriate to any "nice observation," (61-inch reflecting [telescope](#), 15-inch and 12-inch refracting telescopes) by which the students might gaze at

ASTRONOMY

ASTRONOMY

the face of the moon, or at the current comet, or at the satellites of Jupiter, or the rings of Saturn.



(Whewell was determined that he was going to uncover evidence for such a belief, and thus produce grounds for his easy scorn toward “the flat earthers,” and he could discover this nowhere else: [Aristotle](#), the venerable Bede, Roger Bacon, Thomas Aquinas, John Buriden, Nicholas Oresme, and all other reputable commentators had declared the earth, flatly, to be a globe.)



Photographic proof...

(The four corners have been arbitrarily numbered clockwise.)

(It is to be noted that David Henry Thoreau was studying “Mathematics” and “Natural Philosophy” —which is to say, using the word that was at that time a neologism, “Science”— under this physicist and [astronomer](#), Professor Joseph Lovering, and was studying [Entomology](#) and [Botany](#) under [Dr. Thaddeus William Harris](#).)

From this year into 1842, during the vacancy of the natural history professorship, [Dr. Harris](#) would be lecturing on natural history at [Harvard](#). This was the sole course that Harvard had to offer on the general topic of natural history, and it was taken as Thoreau took it, at the end of the senior year. Harris also was teaching a private class on [Entomology](#) and in this year prepared A REPORT ON THE INSECTS OF MASSACHUSETTS, INJURIOUS TO VEGETATION. He would be building up a carefully described and arranged insect collection, while compiling painstaking indexes to major works on entomology, and over the course of his life would publish something like a hundred articles on insects and insect-related diseases. He was hoping against hope that he would be appointed as the college’s professor of natural history — but that would be a recognition which he would never be granted. When Thoreau took this course, it was in the first year in which it was being offered and consisted of 17 of Harris’s lectures on [Botany](#).



ASTRONOMY

ASTRONOMY

1838

Robert Lucas Chance took out a British patent for his version of the process of casting of mirror glass plates, involving stirring of the molten glass. It would take a decade for this version of the process to become the usual one.

GLASS WINDOWS

There was a strong [Andromedid meteor shower](#) during this year, as there had been in 1798 — this is a shower which we connect with the now-disintegrated periodic Biela's [comet](#).

SKY EVENT

April 22, Morning: A young Dakota captive of the Pawnee, by name Haxti, was on this morning painted red and black, and branded. Then they shot him through the heart as their sacrifice to the Morning Star.⁸⁶

That day in [Concord](#), there was a meeting in the First Parish Church at which [Waldo Emerson](#) and Squire Samuel Hoar spoke. Emerson helped draft a resolution to be sent to Washington about the savage sacrifice being exacted of the [Cherokee nation](#), and promised to write directly about this to President Martin Van Buren.

TRAIL OF TEARS

England had 538 steamboats. The *Sirius*, captained by Lt. Richard Roberts, R.N., 1st to achieve a scheduled ocean crossing, after consuming all of its furniture and one of its masts to supplement what had been a maximum overload of coal, dropped anchor at New-York from Liverpool, England.



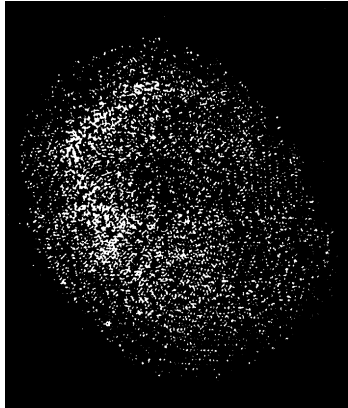
August 9, Thursday: The 1st Perseid meteor shower to have been correctly anticipated and predicted, showed up exactly on schedule. Edward Claudius Herrick had deduced the autumnal nature of this phenomenon from reports of August showers in the years 1781, 1798, 1823, 1833, and 1836, and had inferred that the showers were annual from the fact that Irish peasants had fallen into the habit of referring to these [meteors](#) as the burning tears of St. Lawrence, whose annual festival is on the 10th of August.

ASTRONOMY

SKY EVENT

86. The Morning Star may have been for them the planet [Venus](#) or it may have been the planet [Mars](#). Whichever, this would be the last enactment of this particular religious rite.

August 13, Monday: A [comet](#) visible on this night appeared to contemporary observers as a restful kernel in the magazine of the universe, roughly like this:



[Henry Thoreau](#)'s journal remark of this date, which I suppose may well have been prompted by this apparition, has been utilized in the following manner by Barbara Novak on pages 27-28 of a survey volume edited by John Wilmerding, *AMERICAN LIGHT: THE LUMINIST MOVEMENT 1850-1875; PAINTINGS, DRAWINGS, PHOTOGRAPHS* (National Gallery of Art, Washington DC: Harper & Row, 1980), in an attempt to define Luminism:

On Silence

We can also say that stroke, carrying action, implies sound. A key correlative of luminism is silence. Luminist silence, like luminist time, depends on measured control. Without movement between strokes or between units of form, we hear nothing. Luminist silence implies presence through the sense of **thereness** rather than through activity. Inaudibility is a correlative of immobilized time and objects. Contemporary critics spoke of Kensett's **repose**. Yet luminist silence, in the repose of inaction, represents not a void but a palpable space, in which everything happens while nothing does. We have here a visual analogue of Eckhart's "central silence," and Thoreau's "restful kernel in the magazine of the universe."

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September 18, Tuesday: [Waldo Emerson](#) to his journal in regard to the annular (partial) solar [eclipse](#) (#7260) that passed from Hudson Bay down across northern New England:

SUN

This P.M. the Eclipse. Peter Howe did not like it for his rowan would not make hay: and he said "the sun looked as if a nigger was putting his head into it."



Well, in some sense Peter Howe of Concord was right, black people were indeed raising their head into the sunshine. For on this day of eclipse Frederick Douglass and Anna Murray Douglass, as free Mr. and Mrs. Frederick Johnson, were arriving in their new hometown, [New Bedford](#):

We arrived at [Newport](#) the next morning, and soon after an old fashioned stage-coach, with "New Bedford" in large yellow letters on its sides, came down to the wharf. I had not money enough to pay our fare, and stood hesitating what to do. Fortunately for us, there were two [Quaker](#) gentlemen who were about to take passage on the stage, -Friends William C. Taber and Joseph Ricketson,- who at once discerned our true situation, and, in a peculiarly quiet way, addressing me, Mr. Taber said: "Thee get in." I never obeyed an order with more alacrity, and we were soon on our way to our new home. When we reached "Stone Bridge" the passengers alighted for breakfast, and paid their fares to the driver. We took no breakfast, and, when asked for our fares, I told the driver I would make it right with him when we reached New Bedford. I expected some objection to this on his part, but he made none. When, however, we reached New Bedford, he took our baggage, including three music-books, -two of them collections by Dyer, and one by Shaw,- and held them until I was able to redeem them by paying to him the amount due for our rides. This was soon done, for Mr. Nathan Johnson not only received me kindly and hospitably, but, on being informed about our baggage, at once loaned me the two dollars with which to square accounts with the stage-driver. Mr. and Mrs. Nathan Johnson reached a good old age, and now rest from their labors. I am under many grateful obligations to them. They not only "took me in when a stranger" and "fed me when hungry," but taught me how to make an honest living. Thus, in a fortnight after my flight from [Maryland](#), I was safe in New Bedford, a citizen of the grand old commonwealth of Massachusetts....

WILLIAM C. TABER

JOSEPH RICKETSON

NATHAN JOHNSON

Mary J. Tabor would allege in 1907 something that does not jibe with the popular appreciation of Frederick Douglass that is gathered from reading of his NARRATIVE, to wit, that at this point, with him arriving at



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freedom in New Bedford, he was not yet able to read, let alone to write. She would allege that in New Bedford after his escape from slavery, it had been her relative [William C. Taber](#) who had found for Douglass the stevedoring work he mentions on the wharves (help not acknowledged in Douglass's written account), and she would allege that at this point Douglass had been taught to read by her relative, the New Bedford bookseller Charles Taber:

Owing to the anti-slavery principles of Friends, New Bedford early became a station on the "underground railroad," and if a fugitive slave could once reach this haven of rest, he felt almost safe from pursuit, public opinion being so strong that in the days of the Fugitive Slave Law it would have been impossible to capture a runaway slave in this town.

Frederick Douglass, one of the most remarkable of colored men, passed some time here in safety, and always retained a most grateful recollection of his sojourn among the Quakers. It happened on this wise: Having made his escape from slavery and reached Newport after many perils, he was very anxious to come to New Bedford, that place being known among the slaves as a heaven upon earth.

Hearing the name called out, he peeped shyly around the corner of a building and gazed longingly at the state coach which was filled with "women Friends" on their way home from New England Yearly Meeting. William C. Taber, sitting on the top of the coach, observed the pleading eyes, and said, "Yes, friend, it is all right, climb up here beside me."

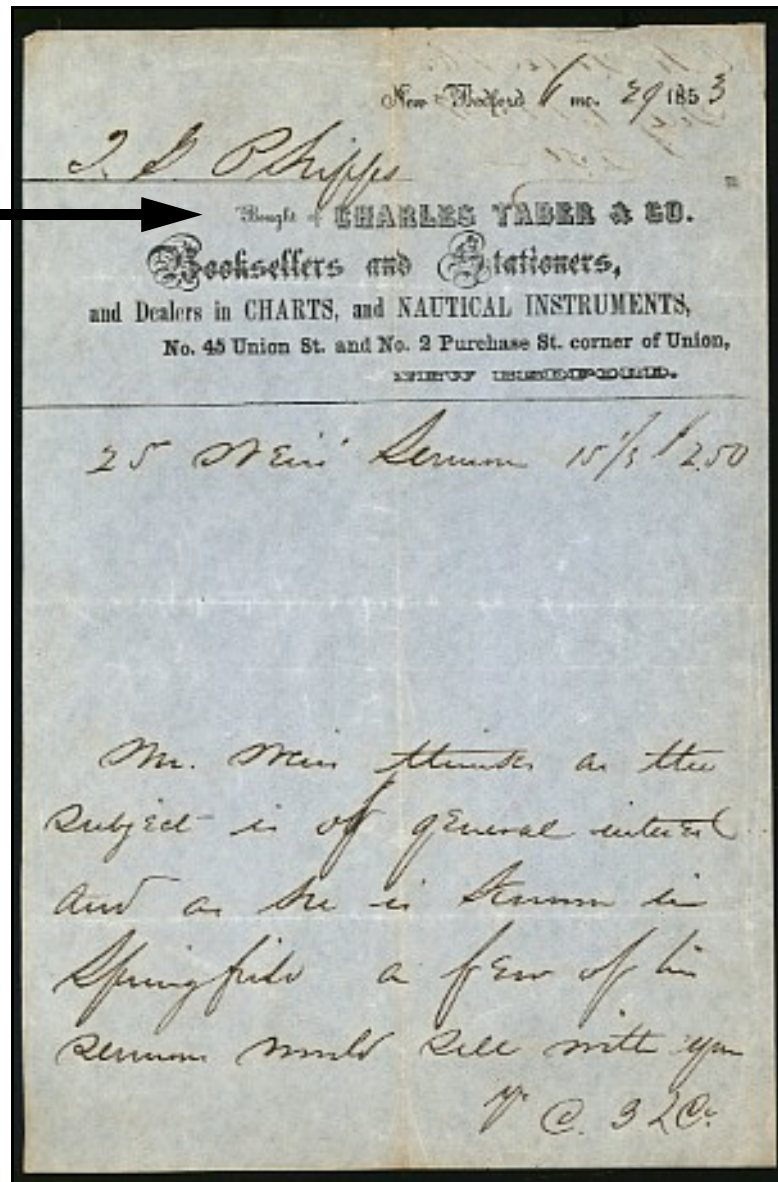
No sooner said than done, William C. Taber paid his fare, brought him to his own house, and found work for him on the wharves, as he had been a stevedore at the South. While in New Bedford, he was taught to read by Charles Taber.

Thus the distinguished orator was launched on the road to fame.

ASTRONOMY

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New Bedford bookseller
Charles Taber, who taught
Frederick Douglass to read



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What we have, above, is essentially an assertion that when Douglass arrived in [New Bedford](#) aboard that stage from [Newport, Rhode Island](#), he could not yet read, let alone write. —That that is importantly discordant with the fulsome manner in which the NARRATIVE is now conventionally read, is something that goes without saying.

For their wedding document, the newlyweds had adopted the family name Johnson, but soon this came to seem an unwise selection. At the time the Douglasses were there, New Bedford had the highest per capita income in America. When the fugitive slave Freddy Bailey, then calling himself Frederick Johnson, arrived at the home of Nathan Johnson and Mary “Polly” Johnson in New Bedford (the Douglasses are not the only guests

This is the recent dedication of a plaque at the site, attended by descendants of the original participants:



documented to have found refuge for a time at 21 Seventh Street, next door to the Friends meetinghouse),



Nathan was reading [Robert Burns](#), and within a day or two Johnson would rename him after the hero Douglas



in LADY OF THE LAKE, as Frederick Douglass. (Frederick decided to spell it “Douglass” because there were some black families in New Bedford who were spelling their name that way.)⁸⁷

87. But why did Freddy Bailey *alias* Fred Johnson **accept** the proffered name “Douglass”? Merely because it had been suggested to him? I think not! The Following is from a collection of Douglass’s speeches entitled LECTURES ON AMERICAN-SLAVERY, which would be published in 1851:

It is often said, by the opponents of the Anti-slavery cause that, the condition of the people of Ireland is more deplorable than that of the American slaves. Far be it from me to underrate the sufferings of the Irish people. They have been long oppressed; and the same heart that prompts me to plead the cause of the American bondman, makes it impossible for me not to sympathize with all the oppressed of all lands. Yet I must say that there is no analogy between the two cases. The Irishman is poor, but he is not a slave. He may be in rags, but he is not a slave. He is still the master of his own body and can say with the poet,

“The hand of Douglass is his own.”



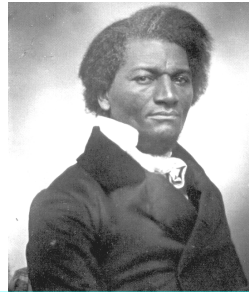
Thus in all probability the name was chosen because although it was intentionally opaque it nevertheless suggested, at least to its bearer, in the idea that “The hand of Douglass is his own,” the same sort of thing that was suggested in that time by the more usual name “Freeman” meaning “the free man.”

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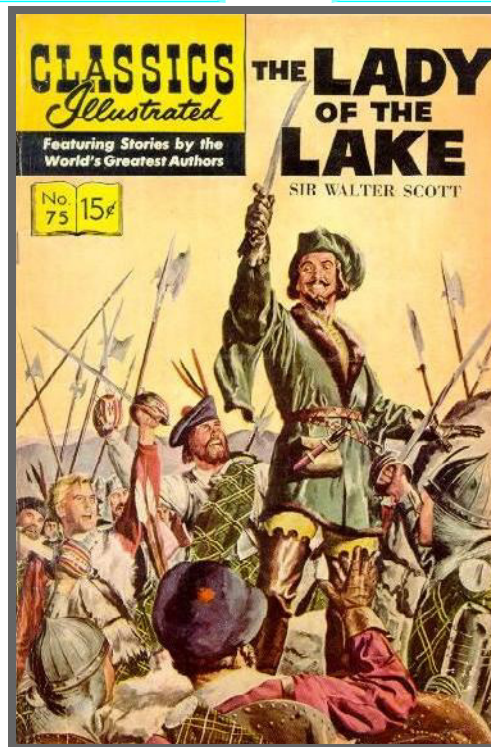
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ANNA MURRAY DOUGLASS



FREDERICK DOUGLASS



The first thing these Douglasses with a wedding certificate in the name of Johnson, but with no [manumission](#) papers to produce for the husband whether he was named “Mr. Douglas” or “Mr. Johnson,” discovered in “free” [New Bedford](#) was that racial prejudice would prevent the husband from using his skills as a ship calker. It was explained that all the white calkers would quit. Work was found for him, by Friend [William C. Taber](#), as a stevedore, carrying oil aboard a vessel, and he then had to saw wood, shovel coal, sweep chimneys, and roll casks in an oil refinery. However, accounts of such Jim Crow experiences would not fit into the narrative he later needed to tell to righteous Northern abolition audiences, for whom South=Them=Evil meant North=Us=Good, and so Douglass ordinarily suppressed this experience of racial prejudice in New Bedford.⁸⁸



Finding my trade of no immediate benefit, I threw off my calking habiliments, and prepared myself to do any kind of work I could get to do.

Although a skilled craftsman could not get work in his craft in that city at that time, due entirely to the color of his skin, Frederick Douglass did not speak of this until 1881 →, when in a reference to “the test of the



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real civilization of the community,” he suggested that the [New Bedford MA](#) of the 1840s had failed that test:

I am told that colored persons can now get employment
at calking in New Bedford.


88. If “French” innocence consists in the refusal to be shamed by the nature of one’s pleasures, and if the “German” variety consists in an awareness that so long as one is sacrificing oneself, no-one has a right to object to one’s sacrificing them as well, and if the “English” consists in a principled refusal to take responsibility for one’s obedience to improper instructions from one’s betters, and the “Italian” in not happening to notice where you have your hand, then the innocence of the USer must consist in a refusal or a failure to recognize evil of which we ourselves are the beneficiaries.



In fuller detail:

... The name given me by my dear mother was no less pretentious and long than Frederick Augustus Washington Bailey. I had, however, while living in [Maryland](#), dispensed with the Augustus Washington, and retained only Frederick Bailey. Between Baltimore and New Bedford, the better to conceal myself from the slave-hunters, I had parted with Bailey and called myself Johnson; but in New Bedford I found that the Johnson family was already so numerous as to cause some confusion in distinguishing them, hence a change in this name seemed desirable. Nathan Johnson, mine host, placed great emphasis upon this necessity, and wished me to allow him to select a name for me. I consented, and he called me by my present name—the one by which I have been known for three and forty years—Frederick Douglass. Mr. Johnson had just been reading the "Lady of the Lake," and so pleased was he with its great character that he wished me to bear his name. Since reading that charming poem myself, I have often thought that, considering the noble hospitality and manly character of Nathan Johnson—black man though he was—he, far more than I, illustrated the virtues of the Douglas of Scotland. Sure am I that, if any slave-catcher had entered his domicile with a view to my recapture, Johnson would have shown himself like him of the "stalwart hand." ...My "Columbian Orator," almost my only book, had done nothing to enlighten me concerning Northern society. I had been taught that slavery was the bottom fact of all wealth. With this foundation idea, I came naturally to the conclusion that poverty must be the general condition of the people of the free States. In the country from which I came, a white man holding no slaves was usually an ignorant and poverty-stricken man, and men of this class were contemptuously called "poor white trash." Hence I supposed that, since the non-slave-holders at the South were ignorant, poor, and degraded as a class, the non-slave-holders at the North must be in a similar condition. I could have landed in no part of the United States where I should have found a more striking and gratifying contrast, not only to life generally in the South, but in the condition of the colored people there, than in New Bedford. I was amazed when Mr. Johnson told me that there was nothing in the laws or constitution of Massachusetts that would prevent a colored man from being governor of the State, if the people should see fit to elect him. There, too, the black man's children attended the public schools with the white man's children, and apparently without objection from any quarter. To impress me with my security from recapture and return to slavery, Mr. Johnson assured me that no slave-holder could take a slave out of New Bedford; that there were men there who would lay down their lives to save me from such a fate.



September 22, Saturday: Shortly after the total solar [eclipse](#) of the afternoon of September 18th  had been visible in New England, Nathaniel Peabody Rogers published the following article in Concord NH's anti-slavery paper [Herald of Freedom](#):

ECLIPSE OF THE SUN.

We had a fine opportunity, on our way from Plymouth to Concord, to witness this grand conjunction of the mighty orbs of the sky -this conflict of the "greater and lesser lights"- the lesser obscuring the greater, as is sometimes the case among *sublunary* bodies, by force of position. The glorious sun was indeed "sick almost to doomsday," -and it was pitiful to see his regal distress, and with what dignity and decency he drew around him his robe of clouds, to hide his disaster and shame from the smoked-glass gaze of mortals. The atmosphere and the landscape sombered at his obscuration, and he looked, as the foul intrusion overshadowed his disk, like a noble nature seized upon, darkened, marred and smothered to blackness and darkness, by the Genius of slavery. The envious eclipse passes off, and the released luminary shines on gloriously again in mid heaven. Slavery is perpetual eclipse -sickness to "doomsday" -eternal obscuration. May God in his mercy rectify the erring orbs of life, to prevent and remove such fatal moral *conjunctions*.

All animate creation seemed to apprehend and notice instinctively the malady of the heavens. The few birds that remain extant at this unmusical season, gave token of their apprehension of night-fall by betaking themselves to the topmost boughs of the trees - to get as late a good-night as they could, from the blessed luminary whose good morrow they hail with such choral gladness, in that joyous season when "the time of the singing of birds is come." The cricket and the grasshopper, in the fields by the road side, set up, as night came down, their twilight hum, and blew their "drowsy bugle." A drove of cattle, through which we passed, on the way to Brighton -like a coffle from the city of WASHINGTON to Alabama- halted, as the drover told us, as if the hour for putting up at night had come. And our own good steed, refreshed by the coolness of the temperature, and warned by the deepening shadows, set up his evening trot, in full remembrance, as well as his master, of Concord hospitality -for he has a "memory like a horse"- and had every visible and ostensible reason to believe, that stable-time and release from the harness were at hand. Would that the poor human cattle of the republic could realize such a season! But neither night nor eclipse brings respite to them. THEY ARE SLAVES.

At the height of the obscuration, the sky wore the appearance of real sunset - a sunset far up from the horizon, with blue sky below, between it and the hills. The passing off of the eclipse was invisible, by reason of the thick, hard, night-looking clouds, and the sun did not reappear to give assurance of his recovery. May it not be emblematic of the extinction of slavery in this country amid the gloomy shadowings and night of insurrection, which our friend, the Observer, deprecates with such deep shuddering - while the prospect of *eternal slavery* he can look on with most serene composure.

The "specious twilight" of the eclipse gradually put on evening's *bona fide* enshroudings, and settled into — but we forget that our eclipse was seen by all our readers, and will leave them, with the wish, that the sun may rise upon them again on the morrow, all unmarred and unscathed by his conflict with the "dirty planet," and light them all on the way to a day of anti-slavery gratitude and duty.

(We may trust that in particular this will be true for one new black family in [New Bedford](#).)

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October 23: [German](#) astronomer Friedrich Wilhelm Bessel (1784-1846) wrote from Konigsberg to Sir J. Herschel Bart telling him that the distance from Earth to the star 61 Cygni (Alpha Centauri), the star system that happens to be closest to us, had been measured, using the parallax method (this was the 1st time the distance of a star other than our sun Sol had been measured, and amounted to a shattering revelation since it demolished a fundamental division in [astronomy](#), that between the sub-aetherial realm of changefulness which existed within the orbit of the moon or perhaps within the orbits of the wandering planets, on the one hand, and on the other hand the aetherial realm of the fixed and eternal stellar canopy).

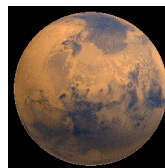
From this date until March 24, 1839, the last large group of the [Cherokee nation](#), 1,766 persons led by Peter Hildebrand, would be attempting to travel from the Appalachian concentration camps to the Oklahoma Territory, but would be held up for a month alongside the Gasconade River in Missouri, too sick to move forward. They had left behind, hiding in the Cherokee ancestral caves in the Appalachian mountains, a number of others such as the sons of Matiyuh who had evaded the initial roundups by the US Cavalry into the concentration camps in the valleys.

TRAIL OF TEARS



1839

The dark area surrounding the north polar cap of the planet [Mars](#) was observed to have become fainter and narrower.



ASTRONOMY

Biela's [comet](#) returned during this year, but it was this time so situated in the skies that it was not seen.

SKY EVENT

In Boston, the American Anti-Slavery Society put out for sale a printing entitled THE LIBERTY BELL, as a fund-raising effort of the “Friends of Freedom”:



THE LIBERTY BELL, 1839

- Maria W. Chapman. “Sonnet Suggested by the Inscription on the Philadelphia Liberty Bell”
- Bradburn, George. “Incendiarism of Abolitionists”
- [Lydia Maria Child](#). “Lines to Those Men and Women, Who Were Avowed Abolitionists in 1831, ’32, ’33, ’34, and ’35”
- Quincy, Edmund. “Mother Coelia”
- Chapman, Ann Greene. “Address of a Russian to the Corpse of his Friend”
- Garrison, William Lloyd. “To the Memory of Ann Greene Chapman”

Like the previous item, an obituary poem for a cherished friend and inspired advocate of the oppressed. Departing from conventional gender constructions, Garrison praises not Chapman’s private life, but her public and political work.

- Weston, Anne Warren. “Lines written on hearing the remark of a friend, that a large number of abolitionists had died during the preceding years”
- [David Lee Child](#). [Untitled prayer]
- [Lydia Maria Child](#). “Charity Bowery”
- Weston, Caroline. “The Church and the World”

Lengthy poem chronicling the world’s hostility to Truth since the age of prophecy. As in times past, “Christ’s faithful servants here/Must walk with DANGER grim!” Interesting example of abolitionist literary iconography, particularly their self-representation as isolated, persecuted, and misunderstood, much like Christ.

- Robbins, Mary Eliza. “Freedom”
- Chapman, Maria Weston. “Lines Inscribed to the Intolerant, throughout New England and the Coasts thereof”

Poem defending fund-raising fairs as valuable abolitionist work.

- [Harriet Martineau](#). “Extract from a Letter”
- Sargent, Henrietta. “Queen Esther’s Banquet”
- [Lydia Maria Child](#). “Anecdote of Elias Hicks”
- Chapman, Maria Weston. “Sonnet: The Anniversary of Lovejoy’s Martyrdom”

ELIAS HICKS

[Elijah Parish Lovejoy](#) was an abolitionist newspaper editor who was murdered by a pro-slavery mob in 1837 in Alton, Illinois.

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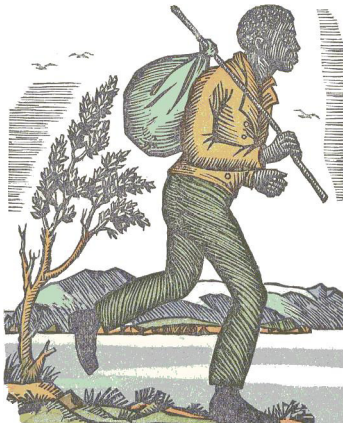
ASTRONOMY

This sonnet praises Lovejoy's "sacrifice"; the poet urges readers to rejoice rather than mourn.



- [Lydia Maria Child](#). "The Emancipated Slaveholders"
- John Pierpont. "The Fugitive Slave's Apostrophe to the North Star."

This swiftly-paced poem relies on vivid imagery.



- Chapman, Maria Weston. "The British India Society"
- Phillips, Wendell. "Extract From a Letter, Read Before the Glasgow Emancipation Society"
- Follen, Eliza Lee. "Pious Trust"
- Garrison, William Lloyd. "The Cause of Emancipation"
- Clark, Mary. "Perfect Freedom"

Poem praising freedom in conventional terms; the Liberty Bell is a metaphor for freedom.

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- Follen, Charles. "The Last Hope"



October: President Josiah Quincy, Sr. of [Harvard College](#) had managed to attract [William Cranch Bond](#) to bring his home astronomical equipment from Dorchester to Cambridge, and set it up as the official [Harvard Observatory](#) to belatedly replace the telescopes and [chronometers](#) which had been lost in the great Harvard Yard fire of 1764. During this month, Bond having already been "drawn to Cambridge by the strong hand of President Quincy," approval for this was sought of the Board of Overseers of the Corporation.

ASTRONOMY

September 4, Wednesday: According to the journal of [Friend Thomas B. Hazard](#) or Hafsard or Hasard of [Kingstown, Rhode Island](#), also known as "Nailer Tom,"⁸⁹ there had been "strange [Northern lights](#) last night."



AURORA BOREALIS



Sept 4th [Wednesday of WEEK] As we shoved away from this rocky coast, before sunrise, the smaller bittern, the genius of the shore, was moping along its edge, or stood probing the mud for its food, with ever an eye on us, though so demurely at work, or else he ran along over the wet stones like a wrecker in his storm-coat, looking out for wrecks of snails and cockles. Now away he goes, with a limping flight, uncertain where he will alight, until a rod of clear sand amid the alders invites his feet; and now our steady approach compels him to seek a new retreat. It is a bird of the oldest [Thalesian](#) school, and no doubt believes in the priority of water to the other elements; the relic of a twilight antediluvian age which yet inhabits these bright American rivers with us Yankees. There is something venerable in this melancholy and contemplative race of birds, which may have trodden the earth while it was yet in a slimy and imperfect state. Perchance their tracks, too, are still visible on the stones. It still lingers into our glaring summers, bravely supporting its fate without sympathy from man, as if it looked forward to some second advent of which he has no assurance. One wonders if, by its patient study by rocks and sandy capes, it has wrested the whole of her secret from Nature yet. What a rich experience it must have gained, standing on one leg and looking out from its dull eye so long on sunshine and rain, moon and stars! What could it tell of stagnant pools and reeds and dank night fogs! It would be worth the while to look closely into the eye which has been open and seeing at such hours, and in such solitudes its dull, yellowish, greenish eye. Methinks my own soul must be a bright invisible green. I have seen these birds stand by the half dozen together in the shallower water along the shore, with their bills thrust into the mud at the bottom, probing for

89. He was called "Nailer Tom" because his trade was the cutting of nails from scrap iron, and in order to distinguish him from a relative known as "College Tom," from another relative known as "Shepherd Tom," and from his own son who –because he had fits– was known as "Pistol-Head Tom."



ASTRONOMY

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food, the whole head being concealed, while the neck and body formed an arch above the water.

Thoreau's smaller bittern, the Green Heron, like all members of the heron family, catches its food with quick stabs of its bill. It does not probe the mud as do many species of shorebird. Since Green Herons often feed in still, shallow water, reflections may have caused Thoreau to think their bills were thrust into the mud. It must be remembered that Thoreau had no optical equipment at this time to aid his observations. -Cruikshank, Helen Gere. THOREAU ON BIRDS (New York: McGraw-Hill Book Company, 1964)



Sept 4th Wednesday. Hooksett east bank 2 or 3 miles below the village, opposite mr. Mitchels.

On Thursday, Thoreau and his brother halted at a point east of Uncannunuc Mountain near Manchester, New Hampshire. They hung their tent and buffalo robes in a farmer's barn to dry and then continued on foot up the Merrimack until it became the Pemigewasset and then the Wild Amonoosuck to its very fountainhead. This part of the adventure is not included in the book. However, Thursday morning as the brothers lay in their tent listening to the rain, they found such enjoyment in birds as those who never venture into a wet world can never know. -Cruikshank, Helen Gere. THOREAU ON BIRDS (New York: McGraw-Hill Book Company, 1964)



A WEEK: The small houses which were scattered along the river at intervals of a mile or more were commonly out of sight to us, but sometimes, when we rowed near the shore, we heard the peevish note of a hen, or some slight domestic sound, which betrayed them. The lock-men's houses were particularly well placed, retired, and high, always at falls or rapids, and commanding the pleasantest reaches of the river, -for it is generally wider and more lake-like just above a fall,- and there they wait for boats. These humble dwellings, homely and sincere, in which a hearth was still the essential part, were more pleasing to our eyes than palaces or castles would have been. In the noon of these days, as we have said, we occasionally climbed the banks and approached these houses, to get a glass of water and make acquaintance with their inhabitants. High in the leafy bank, surrounded commonly by a small patch of corn and beans, squashes and melons, with sometimes a graceful hop-yard on one side, and some running vine over the windows, they appeared like beehives set to gather honey for a summer. I have not read of any Arcadian life which surpasses the actual luxury and serenity of these New England dwellings. For the outward gilding, at least, the age is golden enough. As you approach the sunny doorway, awakening the echoes by your steps, still no sound from these barracks of repose, and you fear that the gentlest knock may seem rude to the Oriental dreamers. The door is opened, perchance, by some Yankee-Hindoo woman, whose small-voiced but sincere hospitality, out of the bottomless depths of a quiet nature, has travelled quite round to the opposite side, and fears only to obtrude its kindness. You step over the white-scoured floor to the bright "dresser" lightly, as if afraid to disturb the devotions of the household, -for Oriental dynasties appear to have passed away since the dinner-table was last spread here,- and thence to the frequented curb, where you see your long-forgotten, unshaven face at the bottom, in juxtaposition with new-made butter and the trout in the well. "Perhaps you would like some molasses and ginger," suggests the faint noon voice. Sometimes there sits the brother who follows the sea, their representative man; who knows only how far it is to the nearest port, no more distances, all the rest is sea and distant capes, - patting the dog, or dandling the kitten in arms that were stretched by the cable and the oar, pulling against Boreas or the trade-winds. He looks up at the stranger, half pleased, half astonished, with a mariner's eye, as if he were a dolphin within cast. If men will believe it, *sua si bona norint*, there are no more quiet Tempes, nor more poetic and Arcadian lives, than may be lived in these New England dwellings. We thought that the employment of their inhabitants by day would be to tend the flowers and herds, and at night, like the shepherds of old, to cluster and give names to the stars from the river banks.

CAT

[The full Latin expression that goes with “*sua si bona norint*” is “*O fortunatos nimium, sua si bona norint*,” which means “0 more than happy, if they only knew their advantages,” and was used by [Virgil](#) to describe those who led the rustic bucolic agricultural life. We can say, therefore, that Virgil is a presence not only in Thoreau’s WALDEN, but also in A WEEK.]

December 18, Wednesday: The new American Statistical Society, in which [Lemuel Shattuck](#) was a mover and shaker, on this day elected a president, two vice presidents, a recording secretary, a home secretary, a foreign secretary, and nine counselors. Richard Fletcher would serve as president.

In New-York Dr. John William Draper, working with Samuel F.B. Morse and the new “Daguerreotype” method Morse has brought back from France, made the first US celestial photograph — one of the moon.

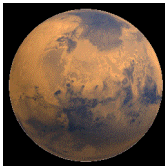
ASTRONOMY

December 31, Tuesday: [William Cranch Bond](#) made his first astronomical observations in Cambridge. Pending funds for construction, the cupola of the existing Dana house⁹⁰ would have to serve until 1844 as the [Harvard Observatory](#).

ASTRONOMY

1840

The first map of the surface features of the planet [Mars](#) was prepared.



ASTRONOMY

January: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

157	1840	Jan.	4.47112	120	6	15	192	20	58	72	14	23	53	5	41	0.6184594			D	Lundhal.
158	1840	Mar.	12.9541	236	13	45	79	43	48	156	29	57	59	14	31	1.221652			R	Kysdeus.
			13.19598	236	58	48	80	20	17	156	38	31	59	12	36	1.204500	0.9932341	2423	R	Loomis.
159	1840	April	2.49544	186	11	6	324	20	49	229	50	17	79	51	52	0.748933			R	Rumcker.
160	1840	Nov.	13.66422	249	3	29	22	39	37	133	36	8	57	57	52	1.4809610	0.9706716	360	D	Gotze.
161	1842	Dec.	15.95797	207	55	43	327	23	48	240	31	55	73	34	4	0.1504425			R	Petersen.
162	1843*	Feb.	27.40173	0	27	28	278	41	22	81	46	6	35	50	14	0.0055824	0.9998308	189½	R	Gould.
163	1843	May	6.17612	157	20	6	281	40	42	124	20	36	52	45	57	1.6171643			D	Hind.
			6.02329	157	20	17	281	33	14	124	12	57	52	44	11	1.6158267			D	Gotze.
			6.01872	157	20	20	281	35	8	124	14	48	52	44	46	1.616335	0.9998202	852040	D	Gotze.
164	1843	Oct.	18.29404	209	23	46	50	16	8	100	52	22	11	18	46	1.6921300	0.5500864	7.293	D	Petersen.
			18.32585	209	23	45	50	17	16	100	53	31	11	18	42	1.6922135	0.5499640	7.291	D	Agardh.
			17.47791	209	33	9	49	49	59	100	16	50	11	21	28	1.6923778	0.5541125	7.394	D	Goldschmidt.
			17.87639	209	28	0	50	4	23	100	36	23	11	20	46	1.6934827	0.5526020	7.366	D	Santini.
			18.43706	209	19	59	50	18	40	100	58	41	11	16	56	1.690232	0.5485724	7.245	D	Argelander.
165	1844	Sept.	2.47595	63	53	0	342	35	16	278	42	16	2	54	46	1.186249	0.6171573	5.459	D	Nicolai.
			2.50462	63	56	31	342	37	46	278	41	15	2	54	27	1.185387	0.6158599	5.421	D	Hind.

SKY EVENT

90. At that time the Dana house was located where Lamont Library is now located — not on Quincy Street where it is now.

March 23, Monday: Doctor John Draper obtained a “representation of the moon’s image” an inch in diameter, with noticeable detail, by a 20-30 minute exposure of a Daguerreotype plate. (Unfortunately, this image, and a similar image made by Daguerre that had been made on the night of January 2, 1839, have been lost to fire over the years. The earliest surviving image of the moon is now the one at Harvard University, on a plate that was exposed on the night of September 1, 1849 without the assistance of a telescope.)

According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

157	1840	Jan.	4.47112	120	6	15	192	20	38	72	14	23	53	5	41	0.6184594			D	Lundhal.
158	1840	Mar.	12.9541	236	13	45	79	43	48	156	29	57	59	14	31	1.221652			R	Kysdeus.
			13.19598	236	58	48	80	20	17	156	38	31	59	12	36	1.204500	0.9932341	2423	R	Loomis.
159	1840	April	2.49544	186	11	6	324	20	49	229	50	17	79	51	52	0.748333			R	Rumcker.
160	1840	Nov.	13.66422	249	3	29	22	39	37	133	36	8	57	57	52	1.4809610	0.9706716	360	D	Gotze.
161	1842	Dec.	15.95707	207	55	43	327	23	48	240	31	55	73	34	4	0.1504425			R	Petersen.
162	1843*	Feb.	27.40173	0	27	28	278	41	22	81	46	6	35	50	14	0.0055824	0.9998308	189½	R	Gould.
163	1843	May	6.17612	157	20	6	281	40	42	124	20	36	52	45	57	1.6171643			D	Hind.
			6.02329	157	20	17	281	33	14	124	12	57	52	44	1	1.6158267			D	Gotze.
			6.01872	157	20	20	281	35	8	124	14	48	52	44	46	1.616335	0.9998202	852040	D	Gotze.
164	1843	Oct.	18.29404	209	23	46	50	16	8	100	52	22	11	18	46	1.6921300	0.5500864	7.293	D	Petersen.
			18.32585	209	23	45	50	17	16	100	53	31	11	18	42	1.6922135	0.5499640	7.291	D	Agardh.
			17.47791	209	33	9	49	49	59	100	16	50	11	21	28	1.6923778	0.5541125	7.394	D	Goldschmidt.
			17.87639	209	28	0	50	4	23	100	36	23	11	20	46	1.6934827	0.5526020	7.366	D	Santini.
			18.43706	209	19	59	50	18	40	100	58	41	11	16	56	1.690232	0.5485724	7.245	D	Argelander.
165	1844	Sept.	2.47595	63	53	0	342	35	16	278	42	16	2	54	46	1.186249	0.6171573	5.459	D	Nicolai.
			2.50462	63	56	31	342	37	46	278	41	15	2	54	27	1.185387	0.6158599	5.421	D	Hind.

SKY EVENT

March 24, Tuesday: During a thunderstorm, quantities of grain fell upon Rajket and the surrounding countryside in [India](#). According to a Captain Aston whose report wound up in the [American Journal of Science](#), the seed was not recognizable as one of the cultivated grains of that region.

SKY EVENT

April: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

157	1840	Jan.	4.47112	120	6	15	192	20	38	72	14	23	53	5	41	0.6184594			D	Lundhal.
158	1840	Mar.	12.9541	236	13	45	79	43	48	156	29	57	59	14	31	1.221652			R	Kysdeus.
			13.19598	236	58	48	80	20	17	156	38	31	59	12	36	1.204500	0.9932341	2423	R	Loomis.
159	1840	April	2.49544	186	11	6	324	20	49	229	50	17	79	51	52	0.748333			R	Rumcker.
160	1840	Nov.	13.66422	249	3	29	22	39	37	133	36	8	57	57	52	1.4809610	0.9706716	360	D	Gotze.
161	1842	Dec.	15.95707	207	55	43	327	23	48	240	31	55	73	34	4	0.1504425			R	Petersen.

SKY EVENT

November: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

157	1840	Jan.	4.47112	120	6	15	192	20	38	72	14	23	53	5	41	0.6184594			D	Lundhal.
158	1840	Mar.	12.9541	236	13	45	79	43	48	156	29	57	59	14	31	1.221652			R	Kysdeus.
			13.19598	236	58	48	80	20	17	156	38	31	59	12	36	1.204500	0.9932341	2423	R	Loomis.
159	1840	April	2.49544	186	11	6	324	20	49	229	50	17	79	51	52	0.748333			R	Rumcker.
160	1840	Nov.	13.66422	249	3	29	22	39	37	133	36	8	57	57	52	1.4809610	0.9706716	360	D	Gotze.
161	1842	Dec.	15.95707	207	55	43	327	23	48	240	31	55	73	34	4	0.1504425			R	Petersen.

SKY EVENT

**1841**

4th edition of [Elijah Hinsdale Burritt](#)'s GEOGRAPHY OF THE HEAVENS.

Some hundred centuries ago, an unstable star we have named Eta Carinae had exploded. In this year the flash of that ancient detonation appeared in the heavens above this planet.⁹¹ So, all you astronomers out there in reality-land — would this have been a “nova” event or a “supernova” event?

ASTRONOMY

July: A small red cloud appeared in a sky which was otherwise clear, above a tobacco field in Wilson County in Tennessee, and the slaves experienced what a local physician, Dr. W.P. Sayle, would take samples of “with my own hands” from “some green tobacco leaves” and report to the University of Nashville as having been a shower of “blood, muscular fiber, adipose matter,” the greatest part of which had been the blood.

[WALDEN](#): Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness.... At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of Nature. We must be refreshed by the sight of inexhaustible vigor, vast and Titanic features, the seacoast with its wrecks, the wilderness with its living and its decaying trees, the thunder cloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.... I love to see that Nature is so rife with life that myriads can be afforded to be sacrificed and suffered to prey on one another; that tender organizations can be so serenely squashed out of existence like pulp, — tadpoles which herons gobble up, and tortoises and toads run over in the road; and that sometimes it has rained flesh and blood!

RAINS OF BLOOD, &C.

1842

[George Phillips Bond](#) began to regularly assist his father [William Cranch Bond](#) at [Harvard College](#)'s observatory.

HARVARD OBSERVATORY

ASTRONOMY

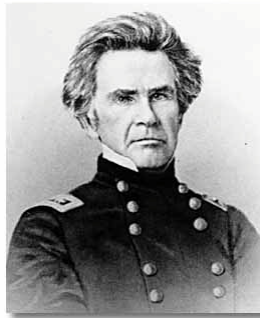
91. The “current” state of this cloud of glowing debris — actually, the state of this debris some $1994 - 1841 = 153$ years subsequent to its detonation a hundred centuries ago— is one of the facts about the universe now being studied by our “rectified” \$1.6B Hubble Space Telescope, in earth orbit 365 miles above our heads.

[Benjamin Peirce](#), son and namesake of the previous [Harvard College](#) librarian, became the Perkins Professor of Astronomy and Mathematics.

HARVARD OBSERVATORY

HARVARD LIBRARY

The initial printing of Ormsby McKnight Mitchel, A.M.'s revision to [Elijah Hinsdale Burritt](#), A.M.'s THE GEOGRAPHY OF THE HEAVENS, AND CLASS BOOK OF ASTRONOMY, ACCOMPANIED BY A CELESTIAL ATLAS. BY ELIJAH H. BURRITT, A.M. REVISED AND CORRECTED BY O. M. MITCHEL, A.M., DIRECTOR OF THE CINCINNATI OBSERVATORY (Huntington and Savage/H.W. Derby. New York/Cincinnati), the edition which began the process of omitting mythology and horoscopes, and establishing [astronomy](#) as a separate science (in the Civil War, this Ormsby McKnight Mitchel would be a Union general).



July 8, Friday: Many astronomers went to the south of France to observe a total solar [eclipse](#).

SKY EVENT

SUN

Lecture Season: The Winter Lecture Season at the Odeon Theatre at the corner of Federal and Franklin streets in Boston:

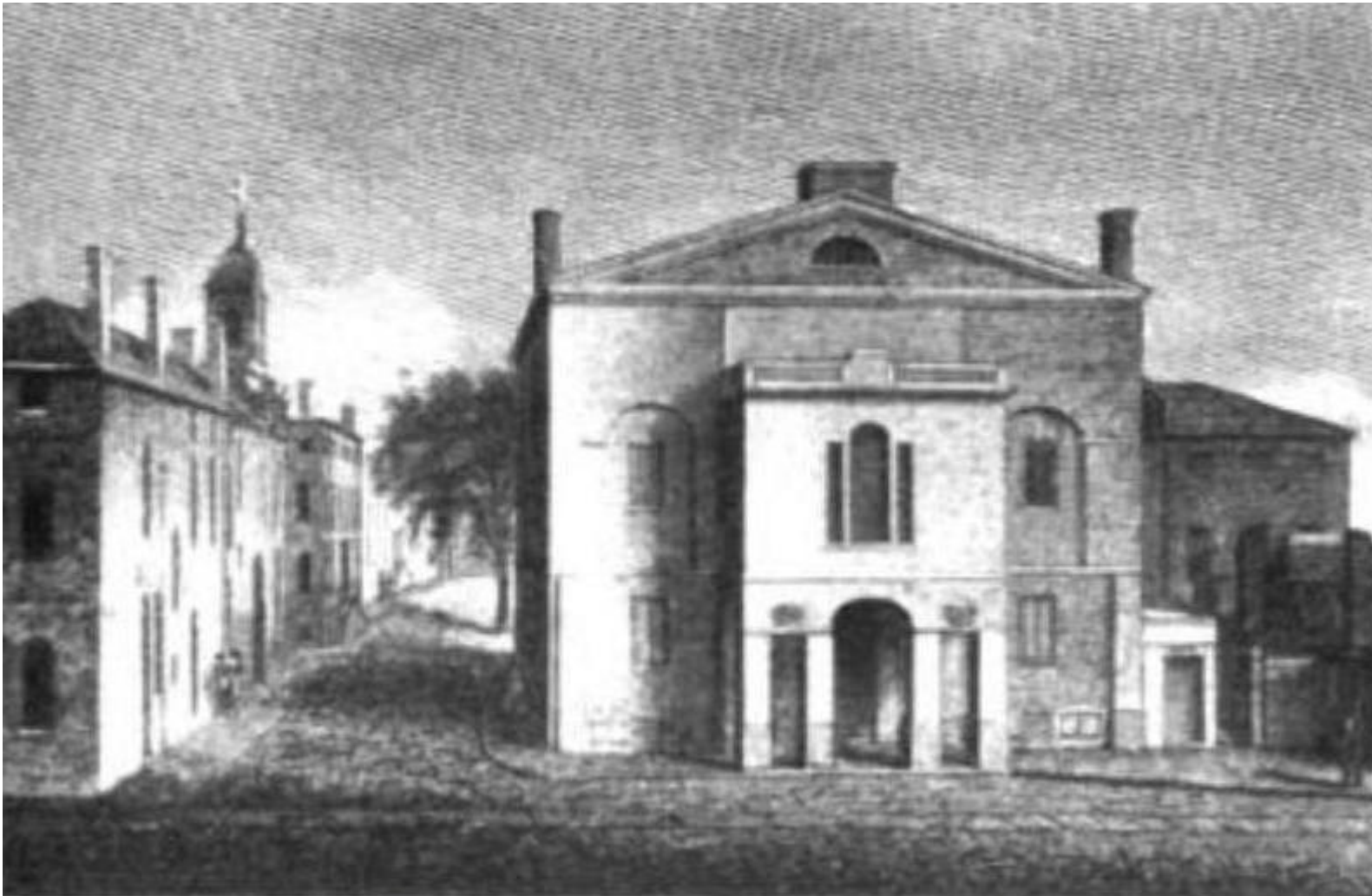
4th Season of The Lowell Institute

Prof. J. Lovering, A.M., [Astronomy](#)
24 lectures

Prof. Jared Sparks, LL.D.
12 lectures

Prof. J. Walker, D.D.
12 lectures

Prof. B. Silliman, LL.D.
24 lectures



The 14th course of lectures offered by the Salem Lyceum may be viewed on the following screen.

(click here)



The Salem Lyceum — 14th Season

John Quincy Adams
Government

[William Mitchell](#)
[Astronomy, Comets](#) (1st lecture)

[William Mitchell](#)
[Astronomy, Comets](#) (2nd lecture)

Humphrey Moore
March of Mind

Reverend George B. Cheever of Salem
Gothic Architecture

L.F. Tasistro
Master Spirits of English Poetry

Benjamin Sears
Germany

Charles Francis Adams, Sr.
Shakspeare (1st lecture)

Charles Francis Adams, Sr.
Shakspeare (2nd lecture)

Dr. Fitch
Music as a Fine Art

Henry Giles
Byron (1st lecture)

Henry Giles
Byron (2nd lecture)

George Bancroft
Spirit of the Age

[Richard Henry Dana, Jr.](#)
Woman

James E. Murdock
Human Voice, with Illustrations

Edwin Jocelyn of Salem
Spirit of Teaching

[Richard Henry Dana, Jr.](#)
Desdemona

John C. Park
Character of the Pilgrims

George H. Colton
American Indians

James E. Murdock
The Passions

Henry Giles
[Elliott](#), the Corn Law Rhymers



ASTRONOMY

ASTRONOMY

December: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

160	1840	Nov.	13.66422	249	3	29	22	39	37	133	36	8	57	57	52	1.4809610	0.9706716	360	D	Gotze.
161	1842	Dec.	15.95707	207	55	43	327	23	48	240	31	55	73	34	4	0.1504425			R	Petersen.
162	1843*	Feb.	27.40173	0	27	28	278	41	22	81	46	6	35	50	14	0.0055824	0.9998308	189	R	Gould.

SKY EVENT

1843

From observing the irregularities in the orbit of Uranus, John Couch Adams (1819-1892) calculated the position of an eighth, as yet unidentified, planet, which was no mean feat considering that the guy didn't **have** a computer, but **was** the computer. Two years later, without knowledge of Adams' work, Urbain Leverrier (1811-1877) would use these same irregularities to calculate the position and argue for the existence of the additional planet. (The inferred planet would not be directly observed until 1846.)

ASTRONOMY

TELESCOPE

ASTRONOMY

ASTRONOMY

The Massachusetts Historical Society published, as part of their COLLECTIONS for this year, an extract from [Andrés Bernáldez](#)'s *HISTORIA DE LOS REYES CATÓLICOS DON FERNANDO Y DOÑA ISABEL*.



ANDRÉS BERNÁLDEZ

[Henry Thoreau](#) would copy from this into his Indian Notebook #2, remark on it in his journal during Spring 1845, and include an excerpt in [A WEEK](#).⁹²

Also included in the COLLECTIONS OF THE MASSACHUSETTS HISTORICAL SOCIETY for 1843 were a number of accounts of the voyage of Captain Bartholomew Gosnold to America in 1602, and [Thoreau](#) would access these for use in [CAPE COD](#).

CAPT. GOSNOLD'S VOYAGE

GABRIEL ARCHER, GENT.

92. The original notebooks are held by the Pierpont Morgan Library in New York, as manuscripts #596 through #606. There are photocopies, made by Robert F. Sayre in the 1930s, in four boxes at the University of Iowa Libraries, accession number MsC 795. More recently, Bradley P. Dean, PhD and Paul Maher, Jr. have attempted to work over these materials.



ASTRONOMY

ASTRONOMY

A WEEK: The sun-setting presumed all men at leisure, and in a contemplative mood; but the farmer's boy only whistled the more thoughtfully as he drove his cows home from pasture, and the teamster refrained from cracking his whip, and guided his team with a subdued voice. The last vestiges of daylight at length disappeared, and as we rowed silently along with our backs toward home through the darkness, only a few stars being visible, we had little to say, but sat absorbed in thought, or in silence listened to the monotonous sound of our oars, a sort of rudimental music, suitable for the ear of Night and the acoustics of her dimly lighted halls;

"Pulsae referunt ad sidera valles,"

and the valleys echoed the sound to the stars.

As we looked up in silence to those distant lights, we were reminded that it was a rare imagination which first taught that the stars are worlds, and had conferred a great benefit on mankind. It is recorded in the Chronicle of Bernaldez, that in Columbus's first voyage the natives "pointed towards the heavens, making signs that they believed that there was all power and holiness." We have reason to be grateful for celestial phenomena, for they chiefly answer to the ideal in man. The stars are distant and unobtrusive, but bright and enduring as our fairest and most memorable experiences. "Let the immortal depth of your soul lead you, but earnestly extend your eyes upwards."

ASTRONOMY



CAPE COD: Cape Cod is commonly said to have been discovered in 1602. We will consider at length under what circumstances, and with what observation and expectations, the first Englishmen whom history clearly discerns approached the coast of New England. According to the accounts of Archer and Brereton (both of whom accompanied Gosnold), on the 26th of March, 1602, old style, Captain Bartholomew Gosnold set sail from Falmouth, England, for the North Part of Virginia, in a small bark called the Concord, they being in all, says one account, "thirty-two persons, whereof eight mariners and sailors, twelve purposing upon the discovery to return with the ship for England, the rest remain there for population." This is regarded as "the first attempt of the English to make a settlement within the limits of New England." Pursuing a new and a shorter course than the usual one by the Canaries, "the 14th of April following" they "had sight of Saint Mary's, an island of the Azores." As their sailors were few and "none of the best," (I use their own phrases,) and they were "going upon an unknown coast," they were not "over-bold to stand in with the shore but in open weather"; so they made their first discovery of land with the lead. The 23d of April the ocean appeared yellow, but on taking up some of the water in a bucket, "it altered not either in color or taste from the sea azure." The 7th of May they saw divers birds whose names they knew, and many others in their "English tongue of no name." The 8th of May "the water changed to a yellowish green, where at seventy fathoms" they "had ground." The 9th, they had upon their lead "many glittering stones," — "which might promise some mineral matter in the bottom." The 10th, they were over a bank which they thought to be near the western end of St. John's Island, and saw schools of fish. The 12th, they say, "continually passed fleeting by us sea-oare, which seemed to have their movable course towards the northeast." On the 13th, they observed "great beds of weeds, much wood, and divers things else floating by," and "had smelling of the shore much as from the southern Cape and Andalusia in Spain." On Friday, the 14th, early in the morning they descried land on the north, in the latitude of forty-three degrees, apparently some part of the coast of Maine. Williamson (History of Maine) says it certainly could not have been south of the central Isle of Shoals. Belknap inclines to think it the south side of Cape Ann. Standing fair along by the shore, about twelve o'clock the same day, they came to anchor and were visited by eight savages, who came off to them "in a Biscay shallop, with sail and oars," — "an iron grapple, and a kettle of copper." These they at first mistook for "Christians distressed." One of them was "apparelled with a waistcoat and breeches of black serge, made after our sea-fashion, hoes and shoes on his feet; all the rest (saving one that had a pair of breeches of blue cloth) were naked." They appeared to have had dealings with "some Basques of St. John de Luz, and to understand much more than we," say the English, "for want of language, could comprehend." But they soon "set sail westward, leaving them and their coast." (This was a remarkable discovery for discoverers.)

JOHN BRERETON

BELKNAP



CAPE COD: "The 15th day," writes Gabriel Archer, "we had again sight of the land, which made ahead, being as we thought an island, by reason of a large sound that appeared westward between it and the main, for coming to the west end thereof, we did perceive a large opening, we called it Shoal Hope. Near this cape we came to anchor in fifteen fathoms, where we took great store of cod-fish, for which we altered the name and called it Cape Cod. Here we saw skulls of herring, mackerel, and other small fish, in great abundance. This is a low sandy shoal, but without danger; also we came to anchor again in sixteen fathoms, fair by the land in the latitude of forty-two degrees. This Cape is well near a mile broad, and lieth northeast by east. The Captain went here ashore, and found the ground to be full of peas, strawberries, whortleberries, etc., as then unripe, the sand also by the shore somewhat deep; the firewood there by us taken in was of cypress, birch, witch-hazel, and beach. A young Indian came here to the captain, armed with his bow and arrows, and had certain plates of copper hanging at his ears; he showed a willingness to help us in our occasions."

"The 16th we trended the coast southerly, which was all champaign and full of grass, but the islands somewhat woody."

Or, according to the account of John Brereton, "riding here," that is where they first communicated with the natives, "in no very good harbor, and withal doubting the weather, about three of the clock the same day in the afternoon we weighed, and standing southerly off into sea the rest of that day and the night following, with a fresh gale of wind, in the morning we found ourselves embayed with a mighty headland; but coming to an anchor about nine of the clock the same day, within a league of the shore, we hoisted out the one half of our shallop, and Captain Bartholomew Gosnold, myself and three others, went ashore, being a white sandy and very bold shore; and marching all that afternoon with our muskets on our necks, on the highest hills which we saw (the weather very hot), at length we perceived this headland to be parcel of the main, and sundry islands lying almost round about it; so returning towards evening to our shallop (for by that time the other part was brought ashore and set together), we espied an Indian, a young man of proper stature, and of a pleasing countenance, and after some familiarity with him, we left him at the sea side, and returned to our ship, where in five or six hours' absence we had pestered our ship so with codfish, that we threw numbers of them overboard again: and surely I am persuaded that in the months of March, April, and May, there is upon this coast better fishing, and in as great plenty, as in Newfoundland; for the skulls of mackerel, herrings, cod, and other fish, that we daily saw as we went and came from the shore, were wonderful," &c.

JOHN BRERETON




CAPE COD: "From this place we sailed round about this headland, almost all the points of the compass, the shore very bold; but as no coast is free from dangers, so I am persuaded this is as free as any. The land somewhat low, full of goodly woods, but in some places plain."

It is not quite clear on which side of the Cape they landed. If it was inside, as would appear from Brereton's words, "From this place we sailed round about this headland almost all the points of the compass," it must have been on the western shore either of Truro or Wellfleet. To one sailing south into Barnstable Bay along the Cape, the only "white, sandy, and very bold shore" that appears is in these towns, though the bank is not so high there as on the eastern side. At a distance of four or five miles the sandy cliffs there look like a long fort of yellow sandstone, they are so level and regular, especially in Wellfleet, — the fort of the land defending itself against the encroachments of the Ocean. They are streaked here and there with a reddish sand as if painted. Farther south the shore is more flat, and less obviously and abruptly sandy, and a little tinge of green here and there in the marshes appears to the sailor like a rare and precious emerald. But in the Journal of Pring's Voyage the next year (and Salterne, who was with Pring, had accompanied Gosnold) it is said, "Departing hence [i. e. from Savage Rocks] we bore unto that great gulf which Captain Gosnold overshot the year before." ["Savage Rock," which some have supposed to be, from the name, the Salvages, a ledge about two miles off Rockland, Cape Ann, was probably the Nubble, a large, high rock near the shore, on the east side of York Harbor, Maine. The first land made by Gosnold is presumed by experienced navigators to be Cape Elizabeth, on the same coast. (See Babson's History of Gloucester, Massachusetts.)]

JOHN BRERETON


So they sailed round the Cape, calling the southeasterly extremity "Point Cave," till they came to an island which they named Martha's Vineyard (now called No Man's Land), and another on which they dwelt awhile, which they named Elizabeth's Island, in honor of the queen, one of the group since so called, now known by its Indian name Cuttyhunk. There they built a small storehouse, the first house built by the English in New England, whose cellar could recently still be seen, made partly of stones taken from the beach. Bancroft says (edition of 1837), the ruins of the fort can no longer be discerned. They who were to have remained becoming discontented, all together set sail for England with a load of sassafras and other commodities, on the 18th of June following.


In 1664,  it had been coming to be understood that there were such things as spots on the face of the sun. At this point, after 17 years of study, Samuel Heinrich Schwabe announced that there was a cycle to such [sunspot](#) activity, the cycle beginning again about once a decade (actually, this has been averaging about eleven years).


SUNSPOTS

SKY EVENT

The Sunspot Cycle 1798-1894



Min / Max
1798 - 1804
1810 - 1817
1823 - 1830
 1834 - 1837
1843 - 1849
1857 - 1860
1867 - 1872
1879 - 1884
1889 - 1894





January 27, Friday: A quite unexpected and quite bright and quite fast “sun-grazer” [comet](#) which we now refer to as “1843 I” at this point passed its closest to the earth, well within one astronomical unit. There were no reports as yet that anyone was noting its passage.



This comet would for a little over two hours be actually inside the inner corona of the sun, within some 80,000 miles of the turbulent surface. No-one would have been able to observe it as a dark spot moving across the face of the sun, however, because in fact the solid masses of cometary nuclei inside their clouds of gas are so tiny that even now with much better equipment these black specks are quite invisible against such an overwhelmingly bright background.

Passing so close to the sun, it would be accelerated to approximately 1,270,000 miles per hour before whipping out again into its cold slow floating in the outer darkness.

SKY EVENT

February: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

161	1842	Dec.	15.95707	207	55	43	327	23	48	240	31	55	73	34	4	0.1504425			R	Petersen.
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163	1843	May	6.17612	157	20	6	281	40	42	124	20	36	52	45	57	1.6171643			D	Hind.
			6.02329	157	20	17	281	33	14	124	12	57	52	44	11	1.6158267			D	Gotze.
			6.01872	157	20	20	281	35	8	124	14	48	52	44	46	1.616335	0.9998202	852040	D	Gotze.
164	1843	Oct.	18.29404	209	23	46	50	16	8	100	52	22	11	18	46	1.6921300	0.5500864	7.293	D	Petersen.
			18.32585	209	23	45	50	17	16	100	53	31	11	18	42	1.6922135	0.5499640	7.291	D	Agardh.
			17.47791	209	33	9	49	49	59	100	16	50	11	21	28	1.6923778	0.5541125	7.394	D	Goldschmidt.
			17.87639	209	28	0	50	4	23	100	36	23	11	20	46	1.6934827	0.5526020	7.366	D	Santini.
			18.43706	209	19	59	50	18	40	100	58	41	11	16	56	1.690232	0.5485724	7.245	D	Argelander.

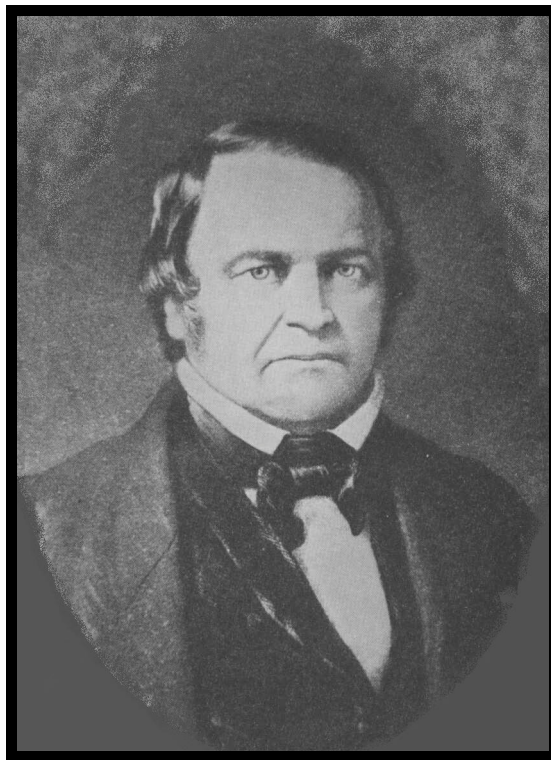
SKY EVENT

ASTRONOMY

ASTRONOMY

At this point early in the year 1843 there were more than 50,000 white [Millerites](#) true believers, each one more credulous than any other, each one more eagerly awaiting the termination of the world as we then knew it. The 4,000 seats within the revival tent would be filled every night between March 21, 1843, and March 21, 1844, with each night the great explainer Miller displaying his chart and recalculating his numbers and producing at the end his inspiring message of doom. Of what conceivable significance to them was an end to human slavery as we knew it?

SEEDS: Who could believe in prophecies of Daniel or of Miller that the world would end this summer, while one milkweed with faith matured its seeds?



Among these Millerite millennialists, oh wow, was the H. Ross Perot richie-rich weirdo of that era, Gerrit Smith.



ASTRONOMY

ASTRONOMY

February 5, Sunday evening: From the southern hemisphere, a new [comet](#) was observed, diving toward the sun. This observation would be reported in a New-York newspaper.



February 11, Saturday: The new [comet](#) that had been observed on the evening of February 5th was confirmed. This also would be mentioned in a New-York newspaper. The comet was very low in the southwest at the end of astronomical twilight. The report placed the comet “in the vicinity of Beta Ceti.”



Was it on this date that [Waldo Emerson](#) mailed to [Henry Thoreau](#) the letter that he had begun composing on February 4th?

93. There is one master myth which drives all our ideology. It is that there is, and that it is necessary for us to discover, the one right way, The Solution, and that if we then hew to this one right way, everything will start to work, and the world will be all set to turn out all right:



It seems, however, that although we are prepared to defend to the death our right to trust in this master myth which drives all our ideology –that there is a right way and all that is necessary is for us to discover and hew to it– this really is not so. This is simply a false description of reality. Our world, actually, is not like this, not like this at all. We’re not living on a Rubik’s Cube and ultimately, things are not going to turn out to our liking. Meanwhile, we’re going to just have to get used to our muddling along, and we’re going to just have to continue, as long as it still seems feasible, to put up with each other as we do our muddle-along thingie.



ASTRONOMY

ASTRONOMY

February 27, Monday, 11AM: Captain Peleg Ray near Concepcion, Chile saw a [comet](#) a little east of the sun. The new [comet](#) was on this date whipping around the sun and had become so incredibly bright that it could be made out by the naked eye as little as one degree away from the edge of the sun during broad daylight, for instance by the entire population of Waterbury CT, as a sharp extra point of light. (We know also that at some point during this period a Chinese record was made of a “broom-star” that was visible “in the day time.”)



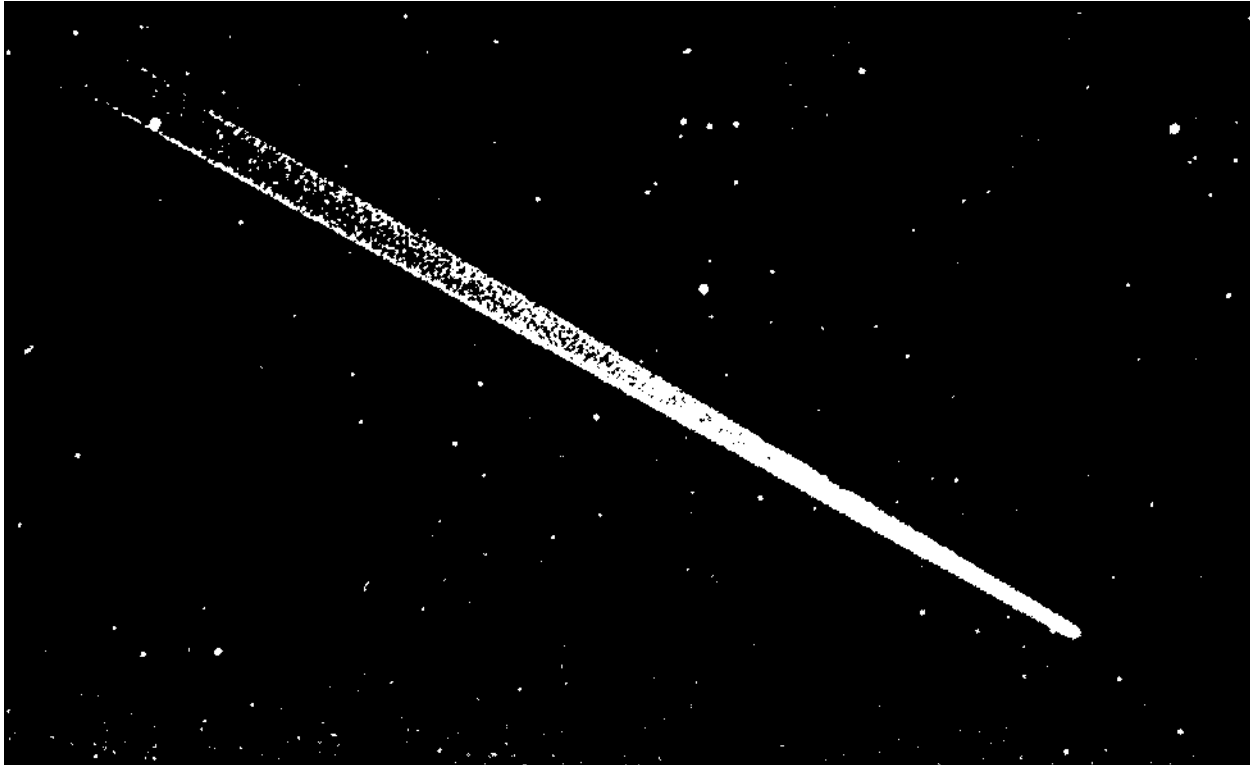
SKY EVENT

February 28, Tuesday: People in [New Bedford](#) saw a [comet](#) as bright as Venus, with a tail $3\times$ long. In the Ile-de-France this comet was seen during the day. A “large part of the adult population” of Waterbury, Connecticut first observed it at 7:30AM “east of and below the sun,” with G.L. Platt, M.C. Leavenworth, S.W. Hall, Alfred Blackman, and N.J. Buel noting that the comet remained visible until the skies clouded up at 3PM. They described it as a round coma with a pale tail extending $2\times$ to $3\times$ and “melting away into the brilliant sky.” The nucleus was detected with the naked eye and was distinctly round, “its light equal to that of the moon in midnight in a clear sky; and its apparent size about one eighth the area of the full moon.” Giovanni Battista Amici of Florence, Italy described it at noon as “the mass, examined by an opera glass, to be like a flame, badly defined, three times as long as it was wide, very luminous towards the sun, and a little smoky at the east.” At noon an observer in Woodstock, Vermont saw the comet and compared it to a small, white cloud, $3\times$ long, adding that when viewed with a telescope, “it presented a distinct and most beautiful appearance, -exhibiting a very white and bright nucleus, and a tail dividing near the nucleus into two separate branches, with the outer sides of each branch convex, and of nearly equal length, apparently $8\times$ or $10\times$, and a space between their extremities of $5\times$ or $6\times$.” Captain J.G. Clarke of Portland, Maine observed the comet in broad daylight and determined that the nearest limb of the nucleus was situated $4\times 06' 15''$ from the sun’s farthest limb and the nucleus and tail appeared as well-defined “as the moon on a clear day,” adding that the comet looked like “a perfectly pure white cloud, without any variation, except a slight change near the head, just sufficient to distinguish the nucleus from the tail at that point.” Bowring, in Chihuahua, Mexico, positioned the comet at a distance of $3\times 53' 20''$ from the sun.

SKY EVENT

This quite unexpected and quite bright and quite fast comet passed the face of the sun in but a little over two hours, its phenomenally long tail stretching across a quarter of the night sky and seeming like “a torch agitated by the wind.” This particular comet would be termed a “sun-grazer,” that is, its course took it so close to the sun, within some 80,000 miles, that it would have accelerated to approximately 1,270,000 miles per hour before being whipped out again into cold slow floating in the outer darkness. [Harvard Observatory](#) staff in the cupola of the Richard Henry Dana, Sr. house would watch for six nights as this comet receded. Even though the equipment was inadequate, [William Cranch Bond](#) was the first to detect the nucleus of the comet. [New](#)

[England](#) newspapers printed reports of worldwide panic.



SKY EVENT

During our time we have not been favored by great comets; our Hale-Bopp was a disappointment and even our Halley's Comet was this time quite unspectacular. To understand the 19th Century, we have to imagine a period of rather frequent and indeed very spectacular sky ghosts and apparitions. This Great Comet of February 1843 actually was merely another fragment of a single gigantic comet that had been regularly lighting up the earth's sky since some point between 18,000BCE and 8,000BCE. Later, the Great September Comet of 1882 would be merely another fragment of this same comet, and would cast a light upon the earth two orders of magnitude brighter than that cast by a full moon — it would be easily visible in broad daylight!



ASTRONOMY

ASTRONOMY

As [Moncure Daniel Conway](#) has presented the *geist* of the period,



Once the seventeen-year locusts swarmed in our woods, devouring the green tissue in every leaf. On each wing was the letter "W" betokening "War," and their united cry of "Pharaoh" prophesied the plagues of Egypt. The locusts came near enough to the Mexican War and to the deadly Spotted Tongue plague that scourged our county, to appear prophetic. But the greatest sensation was caused by the comet of 1843. There was a widespread panic, similar, it was said, to that caused by the meteors of 1832. Apprehending the approach of Judgment Day, crowds besieged the shop of Mr. Petty, our preaching tailor, invoking his prayers. Methodism reaped a harvest from the comet. The negroes, however, were not disturbed; - they were, I believe, always hoping to hear Gabriel's trump.

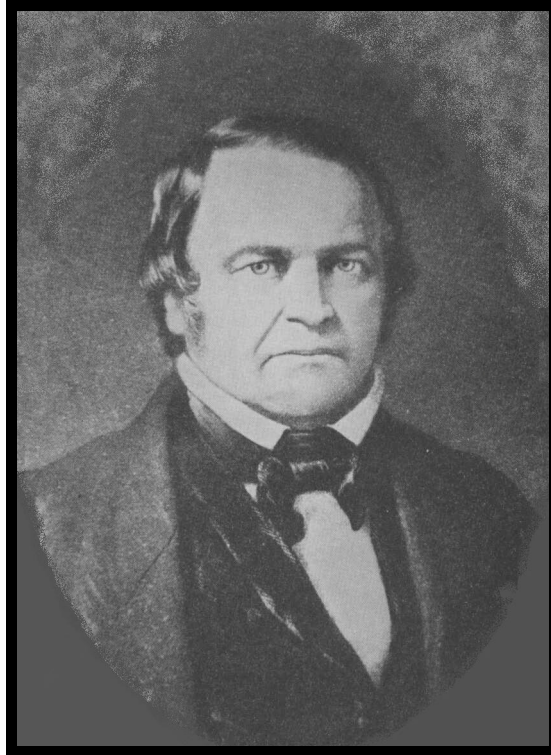
AUTOBIOGRAPHY

VOLUME II

At this point early in the year 1843, over and above "the negroes," above, who were "always hoping to hear Gabriel's trump," there were more than 50,000 white [Millerite](#) true believers, each eagerly awaiting the

termination of the world as we all then knew it. Well, but Henry knew what to make of this phenomenon:

SEEDS: Who could believe in prophecies of Daniel or of Miller that the world would end this summer, while one milkweed with faith matured its seeds?



Europe was in a decade dim:
Upon the future's trembling rim
The comet hovered.
— Herman Melville, CLAREL

Early March: The great [comet](#) was at this point low in the southwest evening skies and as bright as the brightest of the stars, seemingly even brighter than the comet of 1811. Its tail stood upward, straight and narrow, and was 50° in length, extending over a quarter of the sky. Europeans needed to make long journeys in order to be able fully to view this comet in its region of the sky. As the comet approached the sun, it proved to be a sun-grazer, achieving a perihelion, a closest point, of a mere 500,000 miles.⁹⁴ This comet, and the one of 1880 that would be known as the “great Southern” comet, may possibly be the two pieces of a sun-grazing comet which had been seen to be splitting apart as it sped past the sun, by Ephorus in the year 372 BCE. Even so, it was a bright comet, noticeable although it was appearing at noontime only a few degrees from the sun.



SKY EVENT

The [Millerites](#), upon the appearance of such a phenomenon in the heavens, of course at once worked it into their Biblical prophecy of the end of time.

MILLENNIALISM

The Reverend [Adin Ballou](#) of [Hopedale](#) had a comment about this sort of attitude: “The millennium and kingdom must be **within** men, before it can ever be **around** them. Let us have the spirit of the millennium,

94. By way of contrast, the perihelion of Halley’s [comet](#) is 55,000,000 miles, and the perihelion of Enke’s is 31,000,000 miles. Since the diameter of the sun is some 840,000 miles, and since this perihelion measurement is made from the sun’s center of gravity, what this means is that the comet grazed along, a snowball in hell, only some 80,000 miles above the outside surface of the sun. Since the closer the graze of the sun the quicker the trip past the sun, this comet must have passed three-quarters of the way around the sun in less than a day, and must have reached a peak speed of some 1,270,000 miles per hour.

and do the works of the millennium. Then will the millennium have already come.”⁹⁵



March 1, Wednesday: Only the tail of the new [comet](#) was visible above the horizon in the northern hemisphere after sunset. A passenger aboard the *Lawrence* at sea in south latitudes, however, would describe it as “a white streak of light, inclined at an angle of 40° to the horizon, and was imagined to be the zodiacal light.”



SKY EVENT

March 2, Thursday: Captain P.P. King of the British Royal Navy, stationed at Port Stephens in New South Wales, noticed that the view of the tail of the [comet](#) was “producing great alarm among the natives.” The Bishop of Australia made distinct notes about the comet’s appearance and noted, “my attention was drawn to the remarkable spectacle of a definite portion of the tail being deflected from the axis, or direction in which the general body of light continued to proceed. Perhaps, about one-sixth of the train might be thus drawn aside from that which may be termed the natural direction, so as to form therewith, at the point of separation, an angle which I should calculate to be about three degrees....”



SKY EVENT



⁹⁵“GREAT MARCH COMET, (C/1843 D1=1843 I). Followed with the unaided eye from Feb. 5 until Apr. 3, T=1843 February 27. Object a member of the Kreutz sungrazing group of comets. Spotted on February 5 low in the southwestern sky following evening twilight, magnitude perhaps 3 or 4. Moved rapidly to conjunction with the Sun. On the 28th, visible throughout the day in both Europe and America as a brilliant object immediately adjacent to the Sun; incredibly bright (-6 to -8) and displaying a 3 degree tail against the blue sky! For the next two weeks visible mainly from the Southern Hemisphere. In the first week of March, of magnitude 1 or 2 with a 35-40 degree tail. About March 13, tail 45 degrees long, head 3rd magnitude. By mid month comet once again easily visible from northern latitudes, its head situated near the Cetus/ Eridanus border, the tail extending to the south of the star Rigel. Proceeded steadily eastward. On March 20 the head had faded to about magnitude 4 but the long, straight tail could be traced about 65 degrees. At the end of March tail still nearly 40 degrees long. Comet’s head last detected with the naked eye on April 3 but a good portion of the tail was still apparent.”



ASTRONOMY

ASTRONOMY

March 3, Friday: With the closing of the 3d (lame duck) session of the House of Representatives, Whig control over the federal government of the USA came to an end.



Samuel F.B. Morse received a grant of \$30,000 from the US Congress to construct an electric telegraph link between Washington and [Baltimore](#). Morse's line would be completed and used for the first time in 1844.

Piazzi Smyth of the Royal Observatory at the Cape of Good Hope, South Africa, saw the nucleus of the [comet](#) to be "a planetary disk, from which rays emerged in the direction of the tail." He added that "To the naked eye there appeared a double tail, about 25° in length, the two streamers making with each other an angle of about 15° , and proceeding from the head in perfectly straight lines. From the end of the forked tail, and on the north side of it, a streamer diverged at an angle of 6° or 7° towards the north, and reached a distance of upwards of 65° from the comet's head; a similar, though much fainter, streamer was thought to turn off south of the line of direction of the tail." King observed the main tail, as well as "a second ray [which] extended obliquely from it...making with it an angle of 10° ."



March 4, Saturday: [Joseph Smith, Jr.](#) "got married with" his family's 19-year-old maidservant [Emily Dow Partridge](#).

Commander Close of the *Ellenborough* saw the nucleus of the [comet](#) as equal to a star of magnitude 2-3. He would add that its "tail had a darkish line from its nucleus through the centre to the end; it was occasionally brilliant enough to throw a strong light on the sea. The tail was observed to have considerable curvature." King observed the nucleus with a refractor and described it as a "reddish stellar spot" with well-defined edges and about 1' in diameter. The comet was 8° above the horizon. H.A. Cooper in Pernambuco, Brazil described the comet "as particularly small, without any nebulosity, but of extreme brightness, of a golden hue, and a line of the same bright color may be distinctly traced, running directly from it into the tail, for 4° or 5° ; the tail is perhaps 30° in length, and is of a brilliant silver color, perfectly opaque, but becoming less and less dense until it is lost in space."



ASTRONOMY

ASTRONOMY

March 5, Sunday: On this night, [Emily Dow Partridge Smith](#) would later affidavit, she “roomed” with her new husband [Joseph Smith, Jr.](#) and they had “carnal intercourse.”⁹⁶

Piazz Smyth of the Royal Observatory at the Cape of Good Hope, South Africa reported that since March 3rd “the appearance of the [comet](#) was considerably changed; the angle of the north streamer with the direction of the tail had been diminishing, and was now south; it had also diminished in brightness. The total length was about 35°. All the rays proceeding from the head were now of uniform brightness, excepting one bright streak, which could be traced along the tail.”



March 6, Monday: The tail of the new [comet](#) was measured at 36° in length and a 7.5-foot focal length [telescope](#) showed “The nucleus of the head presented rather a well-defined planet-like disc, the diameter of which I estimated to be about 12°, and that of the nebulosity surrounding it at about 45°. The tail had a dark appearance along its axis, as if hollow; and at about half way from the head, it even appeared to separate slightly into two parts, the upper one being rather longer than the other.” A report from St. Helena in the South Atlantic had the tail as 42.9° long. Another calculation estimated the tail length as 23.3°. A passenger aboard the *Lawrence* at sea in south latitudes said the tail was 50° long and was composed of “two streams of light, the outside edges being clear and well-defined.”



March 7, Tuesday: Observers estimated tail lengths for the new [comet](#) ranging from 26° to 43°. An observer in New Haven CT, despite observational difficulties created by a 6-day-old moon, described the comet's tail as “a long, narrow, and brilliant beam, slightly convex upwards, the lower end being apparently below the horizon.”



March 9, Thursday: One estimate of the tail of the new [comet](#) had it at 35.2° long, another had it at 39° long.



⁹⁶. Commonly considered the best kind.

ASTRONOMY

ASTRONOMY

March 11, Saturday: An observer of the new [comet](#) noted that its tail was no longer stellar in appearance but rather had the appearance “of a large star covered with a thin film of cloud, or viewed through a telescope which had not been adjusted to focus.” Tail lengths were reported ranging from 20° to 45° in length.



March 12, Sunday: Edward Cooper of Nice, France observed the [comet](#) in the evening sky when his servant called his attention to it, and recorded it as “a long white light near the western horizon which had somewhat the appearance of that kind of cloud commonly called cirrostratus. Sears Cooke Walker and E. Otis Kendall of the Central High School Observatory in Philadelphia PA first detected the nucleus in their comet searcher as a “well-defined disc larger than Jupiter in the same instrument.”



March 13, Monday: The diameter of the “bright part or disc of the head” of the [comet](#) was measured with a parallel wire micrometer and determined to be at 11". The observer added that the nebulosity surrounding this nucleus was “about four times the diameter” of the disc. Tail lengths were still in the 30° to 45° range.



March 17, Friday: John Frederick William Herschel reported that the new [comet](#) appeared as a “vivid luminous streak,” adding that the tail exhibited no bifurcation, and was nearly parallel to the equator, although a slight curvature was suspected. Captain John Grover at Pisa, Italy reported that he “saw a luminous arc in the heavens, extending from a spot about a degree to the south of Rigel to some clouds which bounded the western horizon. It was about 40 minutes in width; the edges sharply and clearly defined.” Tail lengths reports generally were ranging from 30° to 43°.



ASTRONOMY

ASTRONOMY

March 18, Saturday: Tail lengths reports for the new [comet](#) generally were ranging from 34° to 40° . By this point the comet had come far enough north that its entire tail was visible in the evening skies over most of Europe and the United States. In [Naples](#), one Peters noted that straight above Vesuvius some 40° to 45° of tail were visible despite competition from the light of a full moon. (A tail like this you would be able to view even from the streets of one of today's immense, light-polluted cities.)



SKY EVENT

March 20, Monday: The first free public high school in [Providence, Rhode Island](#) opened its doors for education. At this point the public school system of Providence consisted of six public grammar schools, ten public primary schools, and one public high school. In the first high school classes there would be a few black students, but then racial segregation of educational opportunity would be imposed. Although this school was nominally coeducational, girls were to enter through a separate door into a separated area for instruction — we can see that, interestingly, the problem in regard to race relations was handled in one manner, the problem in regard to gender relations in a distinctly different manner.

Tail lengths reports for the new [comet](#) generally were ranging from 40° to 48° .



SKY EVENT

ASTRONOMY

ASTRONOMY

March 22, Wednesday: [Benjamin Peirce](#), the Perkins Professor of Astronomy and Mathematics, lectured on the topical topic of superstition and comets before a crowd of 1,000 in the Odeon Theatre in [Boston](#). He jested that to some of us, such as the [Millerite](#) followers of the Reverend [William Miller](#), such a new [comet](#) could be seen as prophesying “the end of all things to all of us,” at least to the enlightened persons of his audience, “the generous spirits of Boston,” it might be seen as prophesying the purchase of a decent telescope for [Harvard College](#) and a decent observatory in which to house it.⁹⁷

HARVARD OBSERVATORY

The 15-inch [telescope](#) known as “The Great Refractor” that would be installed on Concord Avenue in Cambridge in 1847 would be ordered from Merz & Mahler of München, Germany during this year. For two decades this would be the largest and most significant telescope in the United States, equal to the finest in the world.⁹⁸

An observer of the [comet](#) noted that “although the sky was very clear, the nucleus was with difficulty perceptible, from which it appeared that the comet was increasing its distance from us with immense rapidity.” He indicated the tail extended about 37°.



SKY EVENT

March 23, Thursday: The crew of the *Dublin* estimated the tail of the new [comet](#) to be about 36.4° long, while another observer found the tail to be 38° long.



SKY EVENT

March 24, Friday: An observer estimated the tail of the new [comet](#) to be 35.2° long. Another observer said the tail was 39° long.



SKY EVENT

97. Safe thoughts to contemplate, as this great [comet](#) which had been taken by some to prophesy the end of time was even then fading quickly into invisibility, with matters here on earth continuing to go on pretty much as before.

ASTRONOMY

98. It would be through detecting errors in the making of this fine instrument that the Clark firm of Boston would be emboldened to embark upon their career in telescope making.

ALVAN CLARK

ASTRONOMY

ASTRONOMY

March 26, Sunday: An observer estimated the tail of the new [comet](#) to be about 35° long. He added, “Through ordinary land-glasses it still appeared as if there was a condensation of brighter matter in the centre of the head.”



March 27, Monday: An observer estimated the tail of the new [comet](#) to be 35° long.



Late in March, after a courtship that had lasted more than 12 years, [Mary Tyler Peabody](#) announced to her intimate relatives, she had gotten her man. –Finally she had sprinkled adequate salt on the tail of a widower named Horace Mann, who lived at her boarding house.

March 31, Friday: Occasionally, through breaks in the clouds, the tail of the [comet](#) could be glimpsed.



April: Although [Edmond Halley](#) had cataloged the star Eta Carinae in 1677 as one of only the 4th magnitude, and during the early 19th century, Eta Carinae had been a run-of-the-mill variable star, sometimes appearing at 4th magnitude, sometimes at 2d, in 1827, in 1832, and in December 1837 it had risen to 1st magnitude, at this point it suddenly brightened so remarkably, to a magnitude of -1, as to become the 2d brightest star in the sky, outshone only by Sirius. For the next two decades, Eta Carinae would be one of the brightest stars in the galaxy. This would be the only nova event that would be visible during [Henry Thoreau](#)'s lifetime. Accompanying this brightening was an expulsion of materials two to three times the weight of our sun from Eta Carinae's polar regions. This material was forming the two lobes now seen in the Hubble view. The glow from these lobes comes mainly from light radiated by Eta Carinae that reflects off the dust of the lobes. The clouds that surround Eta Carinae obscure it from our direct visual observation. According to observations, the Great Eruption appeared to end in 1863 when the star faded in spurts to below naked-eye visibility, stabilizing at about 7th magnitude. Eta Carinae then brightened to 6th and faded back to a dim 8th magnitude. By 1868 it was no longer visible to the naked eye. From 1950 to 1992 the star brightened by a full magnitude, and it is continuing to brighten. In November 1999 its brightness was 4.8 magnitudes, something not seen in this star since the Great Eruption of April 1843.

SKY EVENT

ASTRONOMY

ASTRONOMY

April 2, Sunday: [Joseph Smith, Jr.](#) was at the home of Benjamin Johnson and spent the night in the bed of his sister Almera Woodward Johnson, and asked Benjamin if he might also have his youngest sister, Esther M. Johnson (the record does not indicate whether his request was fulfilled).

[Frederick Douglass](#) lectured for the [Rhode Island](#) Anti-Slavery Society in [Providence](#) on the topic “The Progress of the Cause.”



An observer reported that the [comet](#) had become very faint and that the nucleus was no longer being observed.

SKY EVENT



From Concord, [Henry Thoreau](#) did his duty by offering some golden reflections to the young [Richard F. Fuller](#) at [Harvard College](#).

What I was learning in college was chiefly, I think, to express myself, and I see now, that as the old orator prescribed, 1st, action; 2^d, action; 3^d, action; my teachers should have prescribed to me, 1st, sincerity; 2^d, sincerity; 3^d, sincerity. The old mythology is incomplete without a god or goddess of sincerity, on whose altars we might offer up all the products of our farms, our workshops, and our studies. It should be our Lar when we sit on the hearth, and our Tutelar Genius when we walk abroad. This is the only panacea. I mean sincerity in our dealings with ourselves mainly; any other is comparatively easy. But I must stop before I get to 17thly. I believe I have but one text and one sermon.



ASTRONOMY

ASTRONOMY

To: Richard Fuller
From: HDT
Date: 4/2/43

Concord April 2nd 1843

*Dear Richard,
I was glad to receive a letter
from you, so bright and cheery. You
speak of not having made any conquests
with your own spear or quill as yet,
but if you are tempering your spear-
head during these days, and fitting a
straight and tough shaft thereto,
will not that suffice? We are
more pleased to consider the hero in the
forest cutting cornel or ash for his
spear, than marching in triumph
with his trophies. The present
hour is always wealthiest when it is
poorer than the future ones, as that
is the pleasantest site which affords
the pleasantest prospects.
What you say about your studies
furnishing you with a “mimic idiom” only,
reminds me that we shall all do
well if we learn so much as to talk —
to speak truth. The only fruit which
even much living yields seems to be often
only some trivial success — the ability
to do some slight thing better. We
make conquest only of husks and
shells for the most part — at least
apparently — but sometimes there are
cinnamon and spice, you know. Even
the grown hunter you speak of slays
a thousand buffaloes and brings off only
their hides and tongues. What im-
mense sacrifices — what hecatombs and
holocausts the gods exact for very slight
favors! How much sincere life be-*

*fore we can even utter one sincere word —
 What I was learning in College
 was chiefly, I think, to express myself,
 and I see now that as the old orator
 prescribed 1st action, 2nd action, 3^d action,
 my teachers should have prescribed to
 me 1st sincerity 2nd sincerity, 3^d sincerity.
 The old mythology is incomplete
 without a god or goddess of sincerity, on*

Page 2

*whose altars we might offer up all
 the products of our farms, our work-
 shops, and our studies. It should be
 our Lar when we sit on the hearth,
 and our Tutelar Genius when we walk
 abroad. This is the only panacea. I
 mean sincerity in our dealings with our-
 selves mainly — any other is compari-
 tively easy — but I will stop before
 I get to 17^{thly} — I believe I have
 but one text and one sermon.
 Your rural adventures beyond
 the W. Cambridge hills, have
 probably lost nothing by dis-
 tances of time or space — I used
 to hear only the sough of the wind in
 the woods of ~~Conc~~ Concord, when I was
 striving to give my attention to a page
 of Calculus. — But depend upon it
 you will love your native hills the better
 for being separated from them.
 I expect to leave Concord, which is my
 Rome — and its people, who are my Romans,
 in May, and go to N. york to be a tutor
 in Mr William Emerson's family. — So
 I will bid you good bye till I see
 you or hear from you again.
 Yr friend H.D. Thoreau*

*P.S. Will you take the trouble to carry the inclosed
 letter to Richardson for me — and the vol.
 which Bartlett (Robert) took from
 the library for me — either to Samuel Long-
 fellow, who I believe attends to his concerns,
 or to the librarian?*

ASTRONOMY

ASTRONOMY

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SKY EVENT



From Concord, [Henry Thoreau](#) did his duty by offering some golden reflections to the young [Richard F. Fuller](#) at [Harvard College](#).

What I was learning in college was chiefly, I think, to express myself, and I see now, that as the old orator prescribed, 1st, action; 2^d, action; 3^d, action; my teachers should have prescribed to me, 1st, sincerity; 2^d, sincerity; 3^d, sincerity. The old mythology is incomplete without a god or goddess of sincerity, on whose altars we might offer up all the products of our farms, our workshops, and our studies. It should be our Lar when we sit on the hearth, and our Tutelar Genius when we walk abroad. This is the only panacea. I mean sincerity in our dealings with ourselves mainly; any other is comparatively easy. But I must stop before I get to 17thly. I believe I have but one text and one sermon.



ASTRONOMY

ASTRONOMY

To: Richard Fuller
From: HDT
Date: 4/2/43

Concord April 2nd 1843

*Dear Richard,
I was glad to receive a letter
from you, so bright and cheery. You
speak of not having made any conquests
with your own spear or quill as yet,
but if you are tempering your spear-
head during these days, and fitting a
straight and tough shaft thereto,
will not that suffice? We are
more pleased to consider the hero in the
forest cutting cornel or ash for his
spear, than marching in triumph
with his trophies. The present
hour is always wealthiest when it is
poorer than the future ones, as that
is the pleasantest site which affords
the pleasantest prospects.
What you say about your studies
furnishing you with a “mimic idiom” only,
reminds me that we shall all do
well if we learn so much as to talk —
to speak truth. The only fruit which
even much living yields seems to be often
only some trivial success — the ability
to do some slight thing better. We
make conquest only of husks and
shells for the most part — at least
apparently — but sometimes there are
cinnamon and spice, you know. Even
the grown hunter you speak of slays
a thousand buffaloes and brings off only
their hides and tongues. What im-
mense sacrifices — what hecatombs and
holocausts the gods exact for very slight
favors! How much sincere life be-*

*fore we can even utter one sincere word —
 What I was learning in College
 was chiefly, I think, to express myself,
 and I see now that as the old orator
 prescribed 1st action, 2nd action, 3^d action,
 my teachers should have prescribed to
 me 1st sincerity 2nd sincerity, 3^d sincerity.
 The old mythology is incomplete
 without a god or goddess of sincerity, on*

Page 2

*whose altars we might offer up all
 the products of our farms, our work-
 shops, and our studies. It should be
 our Lar when we sit on the hearth,
 and our Tutelar Genius when we walk
 abroad. This is the only panacea. I
 mean sincerity in our dealings with our-
 selves mainly — any other is compari-
 tively easy — but I will stop before
 I get to 17^{thly} — I believe I have
 but one text and one sermon.
 Your rural adventures beyond
 the W. Cambridge hills, have
 probably lost nothing by dis-
 tances of time or space — I used
 to hear only the sough of the wind in
 the woods of ~~Conc~~ Concord, when I was
 striving to give my attention to a page
 of Calculus. — But depend upon it
 you will love your native hills the better
 for being separated from them.
 I expect to leave Concord, which is my
 Rome — and its people, who are my Romans,
 in May, and go to N. york to be a tutor
 in Mr William Emerson's family. — So
 I will bid you good bye till I see
 you or hear from you again.
 Yr friend H.D. Thoreau*

*P.S. Will you take the trouble to carry the inclosed
 letter to Richardson for me — and the vol.
 which Bartlett (Robert) took from
 the library for me — either to Samuel Long-
 fellow, who I believe attends to his concerns,
 or to the librarian?*

ASTRONOMY

ASTRONOMY

April 6, Thursday: [Joseph Smith, Jr.](#) called a special conference at Nauvoo, Illinois challenging those of the Mormon faith either to accuse him of sin directly — or shut up.

An attempt was made to view the retreating [Great Comet of 1843](#) with an equatorially-mounted, 7.5-foot focal length refractor, but nothing could be made out.



SKY EVENT

April 11, Tuesday: A report on the retreating [comet](#) from F.T. Rusden's telescope station near Gwydir Falls in New South Wales: "by straining my eyes, I could just make out the last faint glimmer of it..."



SKY EVENT

April 19, Wednesday: The last observation of the great [comet](#) of 1843.



SKY EVENT

In the collection of manuscript which has now been published as THE DISPERSION OF SEEDS, on what has become page 87, [Henry Thoreau](#) mused interestingly on this comet:

When lately the comet was hovering in our northwest horizon, the thistledown received the greater share of my attention.... Astronomers can calculate the orbit of that thistledown called the comet, conveying its nucleus, which may not be so solid as a thistle seed, somewhither....

HARVARD OBSERVATORY

April-June: Edward Claudius Herrick reported in the [American Journal of Science](#) that: "It appears quite probable that the train of this [comet](#) was seen in the evening before the perihelion passage, at Bermuda, Philadelphia, and Porto Rico, on the 19th, 23d and 26th of February."



SKY EVENT

May: According to a comet list published in Boston in 1846, attributed to Professor Benjamin Peirce:

163	1843	May	6.17612	157	20	6.281	40	42	124	20	36	52	45	57	1.6171643			D	Hind.	
			6.02329	157	20	17.281	33	14	124	12	57	52	44	11	1.6158267			D	Gotze.	
			6.01872	157	20	20.281	35	8	124	14	48	52	44	46	1.616335	0.9998202	852040	D	Gotze.	
164	1843	Oct	18.29404	209	23	46	50	16	8	100	52	22	11	18	46	1.6921300	0.5500864	7.293	D	Petersen.

SKY EVENT

October: According to a comet list published in Boston in 1846, attributed to Professor Benjamin Peirce:

164	1843	Oct.	18.29404	209	23	46	50	16	8	100	52	22	11	18	46	1.6921300	0.5500864	7.293	D	Petersen.
			18.32585	209	23	45	50	17	16	100	53	31	11	18	42	1.6922135	0.5499640	7.291	D	Agardh.
			17.47791	209	33	9	49	49	59	100	16	50	11	21	28	1.6923778	0.5541125	7.394	D	Goldschmidt.
			17.87639	209	28	0	50	4	23	100	36	23	11	20	46	1.6934827	0.5526020	7.366	D	Santini.
			18.43706	209	19	59	50	18	40	100	58	41	11	16	56	1.690232	0.5485724	7.245	D	Argelander.
165	1844	Sept.	9.47508	58	58	6.919	55	22	11	16	56	1.690232	0.5485724						D	Nicolai.

SKY EVENT

1844

While his son George Bassett Clark was studying engineering, Alvan Clark developed an interest in the optics of large astronomical instruments.



A 5th edition of Ormsby McKnight Mitchel, A.M.’s revision to Elijah Hinsdale Burritt, A.M.’s THE GEOGRAPHY OF THE HEAVENS, AND CLASS BOOK OF ASTRONOMY; ACCOMPANIED BY A CELESTIAL ATLAS. BY ELIJAH H. BURRITT, A.M. FIFTH EDITION. WITH AN INTRODUCTION BY THOMAS DICK, LL.D., AUTHOR OF THE “CHRISTIAN PHILOSOPHER,” &C (New York).



February 20, Tuesday: [Edward George Earle Bulwer](#) assumed the name and arms of Lytton by royal licence and his surname officially became “Bulwer-Lytton.”

In an area of approximately 800 feet square, or smaller, in Jersey City, New Jersey, a substance resembling bloody flesh fell from the sky in pieces varying from the size of a dime to the size of a quarter. This event, which necessitated the re-washing of some clothing that had been strung up to dry, would be duly reported in the local newspapers — and eventually the Concord [Freeman](#) would make a comment on this news item (a report which Thoreau presumably saw).

[WALDEN](#): Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness.... At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of Nature. We must be refreshed by the sight of inexhaustible vigor, vast and Titanic features, the seacoast with its wrecks, the wilderness with its living and its decaying trees, the thunder cloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.... I love to see that Nature is so rife with life that myriads can be afforded to be sacrificed and suffered to prey on one another; that tender organizations can be so serenely squashed out of existence like pulp, — tadpoles which herons gobble up, and tortoises and toads run over in the road; and that sometimes it has rained flesh and blood!

RAINS OF BLOOD, &C.

[Daniel Webster](#) addressed the Supreme Court of the United States in regard to the Girard will, a case which had to do with the Christian ministry and the religious instruction of the young. First, here is a description of the situation before the court, per Edwin P. Whipple's THE GREAT SPEECHES AND ORATIONS OF DANIEL WEBSTER WITH AN ESSAY ON DANIEL WEBSTER AS A MASTER OF ENGLISH STYLE (Boston: Little, Brown, 1879):

The heirs at law of the late Stephen Girard, of Philadelphia, instituted a suit in October, 1836, in the Circuit Court of the Eastern District of Pennsylvania, sitting as a court of equity, to try the question of the validity of his will. In April, 1841, the cause came on for hearing in the Circuit Court, and was decided in favor of the will. The case was carried by appeal to the Supreme Court of the United States, at Washington, where it was argued by General Jones and Mr. Webster for the complainants and appellants, and by Messrs. Binney and Sergeant for the validity of the will.

The following speech was made by Mr. Webster in the course of the trial at Washington. A deep impression was produced upon the public mind by those portions of it which enforced the intimate connection of the Christian ministry with the business of instruction, and the necessity of founding education on a religious basis.

This impression resulted in the following correspondence:—

“Washington, February 13, 1844.

“SIR,—Enclosed is a copy of certain proceedings of a

“Stack of the Artist of Kouroo” Project



meeting held in reference to your argument in the Supreme Court of the case arising out of the late Mr. Girard's will. In communicating to you the request contained in the second resolution, we take leave to express our earnest hope that you may find it convenient to comply with that request.

"We are, Sir, with high consideration, yours, very respectfully,

"P.R. FENDALL,	}	
HORACE STRINGFELLOW,	}	
JOSHUA N. DANFORTH,	}	
R.R. GURLEY,	}	
WILLIAM RUGGLES,	}	Committee.
JOEL S. BACON,	}	
THOMAS SEWALL,	}	
WILLIAM B. EDWARDS,	}	

"HON. DANIEL WEBSTER."

"At a meeting of a number of citizens, belonging to different religious denominations, of Washington and its vicinity, convened to consider the expediency of procuring the publication of so much of Mr. Webster's argument before the Supreme Court of the United States, in the case of François F. Vidal et al., Appellants, v. The Mayor, Aldermen, and Citizens of Philadelphia, and Stephen Girard's Executors, as relates to that part of Mr. Girard's will which excludes ministers of religion from any station or duty in the college directed by the testator to be founded, and denies to them the right of visiting said college; the object of the meeting having been stated by Professor Sewall in a few appropriate remarks, the Hon. Henry L. Ellsworth was elected chairman, and the Rev. Isaac S. Tinsley secretary.

"Whereupon it was, on motion, unanimously resolved,

"1st. That, in the opinion of this meeting, the powerful and eloquent argument of Mr. Webster, on the before-mentioned clause of Mr. Girard's will, demonstrates the vital importance of Christianity to the success of our free institutions, and its necessity as the basis of all useful moral education; and that the general diffusion of that argument among the people of the United States is a matter of deep public interest.

"2d. That a committee of eight persons, of the several Christian denominations represented in this meeting, be appointed to wait on Mr. Webster, and, in the name and on behalf of this meeting, to request him to prepare for the press the portion referred to of his argument in the Girard case; and, should he consent to do so, to cause it to be speedily published and extensively disseminated.

"The following gentlemen were appointed the committee under the second resolution: Philip R. Fendall, Esq., Rev. Horace Stringfellow, Rev. Joshua N. Danforth, Rev. R. Randolph Gurley, Professor William Ruggles, Rev.



ASTRONOMY

ASTRONOMY

President J.S. Bacon, Doctor Thomas Sewall, Rev. William B. Edwards.

"The meeting then adjourned.

"H.L. ELLSWORTH, **Chairman**

"ISAAC S. TINSLEY, **Secretary.**"

"Washington, February 13, 1844.

"GENTLEMEN,—I have the honor to acknowledge the receipt of your communication. Gentlemen connected with the public press have, I believe, reported my speech in the case arising under Mr. Girard's will. I will look over the report of that part of it to which you refer, so far as to see that it is free from material errors, but I have not leisure so to revise it as to give it the form of a careful or regular composition.

"I am, Gentlemen, with very true regard, your obedient servant,

"DANIEL WEBSTER.

"To Messrs. P.R. FENDALL,

HORACE STRINGFELLOW,

JOSHUA N. DANFORTH,

R.R. GURLEY,

WILLIAM RUGGLES,

JOEL S. BACON,

THOMAS SEWALL,

WILLIAM B. EDWARDS."

The following mottoes were prefixed to this speech in its original pamphlet edition:

"**Socrates.** If, then, you wish public measures to be right and noble, **virtue** must be given by you to the citizens.

"**Alcibiades.** How could any one deny that?

"**Socrates.** **Virtue**, therefore, is that which is to be first possessed, both by you and by every other person who would have direction and care, not only for himself and things dear to himself, but for the state and things dear to the state.

"**Alcibiades.** You speak truly.

"**Socrates.** To act justly and wisely (both you and the state), YOU MUST ACT ACCORDING TO THE WILL OF GOD.

"**Alcibiades.** It is so."—**Plato.**

"Sic igitur hoc a principio persuasum civibus, dominos esse omnium rerum ac moderatores, deos."—**Cicero de Legibus.**

"We shall never be such fools as to call in an enemy to the substance of any system, to supply its defects, or to perfect its construction."

"If our religious tenets should ever want a further elucidation, we shall not call on atheism to explain them. We shall not light up our temple from that unhallowed fire."

"We know, and it is our pride to know, that man is, by



his constitution, a religious animal."—**Burke**.

Given that background information — here are Daniel Webster's words to the supreme court on this day:

MAY IT PLEASE YOUR HONORS:—

It is not necessary for me to narrate, in detail, the numerous provisions of Mr. Girard's will. This has already been repeatedly done by other counsel, and I shall content myself with stating and considering those parts only which are immediately involved in the decision of this cause.

The will is drawn with apparent care and method, and is regularly divided into clauses. The first nineteen clauses contain various devises and legacies to relatives, to other private individuals and to public bodies. By the twentieth clause the whole residue of his estate, real and personal, is devised and bequeathed to the "mayor, aldermen, and citizens of Philadelphia," in trust for the several uses to be after mentioned and declared.

The twenty-first clause contains the devise or bequest to the college, in these words:—

"And so far as regards the residue of my personal estate in trust, as to two millions of dollars, part thereof, to apply and expend so much of that sum as may be necessary in erecting, as soon as practicably may be, in the centre of my square of ground, between High and Chestnut Streets, and Eleventh and Twelfth Streets, in the city of Philadelphia, (which square of ground I hereby devote for the purpose hereinafter stated, and for no other, for ever,) a permanent college, with suitable out-buildings sufficiently spacious for the residence and accommodation of at least three hundred scholars, and the requisite teachers and other persons necessary in such an institution as I direct to be established, and in supplying the said college and out-buildings with decent and suitable furniture, as well as books, and all things needful to carry into effect my general design."

The testator then proceeds to direct that the college shall be constructed of the most durable materials, avoiding needless ornament, and attending chiefly to the strength, convenience, and neatness of the whole; and gives directions, very much in detail, respecting the form of the building, and the size and fashion of the rooms. The whole square, he directs, shall be enclosed with a solid wall, at least fourteen inches thick and ten feet high, capped with marble, and guarded with irons on the top, so as to prevent persons from getting over; and there are to be two places of entrance into the square, with two gates at each, one opening inward and the other outward, those opening inward to be of iron, and those opening outward to be of wood-work, lined with sheet-iron.

The testator then proceeds to give his directions respecting the institution, laying down his plan and objects in several articles. The third article is in these words:—

"3. As many poor white male orphans, between the ages of six and ten years, as the said income shall be adequate to maintain, shall be introduced into the



college as soon as possible; and from time to time, as there may be vacancies, or as increased ability from income may warrant, others shall be introduced."

The fifth direction is as follows:-

"5. No orphan should be admitted until the guardians, or directors of the poor, or a proper guardian or other competent authority, shall have given, by indenture, relinquishment, or otherwise, adequate power to the mayor, aldermen, and citizens of Philadelphia, or to directors or others by them appointed, to enforce, in relation to each orphan, every proper restraint, and to prevent relations or others from interfering with or withdrawing such orphan from the institution."

By the sixth article, or direction, preference is to be given, first, to orphans born in Philadelphia; second, to those born in other parts of Pennsylvania; third, to those born in the city of New York; and, lastly, to those born in the city of New Orleans.

By the seventh article, it is declared, that the orphans shall be lodged, fed, and clothed in the college; that they shall be instructed in the various branches of a sound education, comprehending reading, writing, grammar, arithmetic, geography, navigation, surveying, practical mathematics, astronomy, natural, chemical, and experimental philosophy, and the French and Spanish languages, and such other learning and science as the capacities of the scholars may merit or want. The Greek and Latin languages are not forbidden, but are not recommended.

By the ninth article it is declared, that the boys shall remain in the college till they arrive at between fourteen and eighteen years of age, when they shall be bound out by the city government to suitable occupations, such as agriculture, navigation, and the mechanical trades.

The testator proceeds to say, that he necessarily leaves many details to the city government; and then adds, "There are, however, some restrictions which I consider it my duty to prescribe, and to be, amongst others, conditions on which my bequest for said college is made, and to be enjoyed."

The second of these restrictions is in the following words:-

"Secondly. I enjoin and require **that no ecclesiastic, missionary, or minister, of any sect whatever, shall ever hold or exercise any station or duty whatever in the said college; nor shall any such person ever be admitted for any purpose, or as a visitor, within the premises appropriated to the purposes of the said college.**

"In making this restriction, I do not mean to cast any reflection upon any sect or person whatsoever; but, as there is such a diversity of opinion amongst them, I desire to keep the tender minds of the orphans who are to derive advantage from this bequest free from the excitement which clashing doctrines and sectarian controversy are so apt to produce; my desire is, that all the instructors and teachers in the college shall take pains to instil into the minds of the scholars **the**



purest principles of morality, so that on their entrance into active life they may, **from inclination** and habit, evince **benevolence towards their fellow-creatures, and a love of truth, sobriety, and industry**, adopting at the same time such religious tenets as their **matured reason** may enable them to prefer."

The testator having, after the date of his will, bought a house in Penn Township, with forty-five acres of land, he made a codicil, by which he directed the college to be built on this estate, instead of the square mentioned in the will, and the whole establishment to be made thereon, just as if he had in his will devoted the estate to that purpose. The city government has accordingly been advised that the whole forty-five acres must be enclosed with the same high wall as was provided in the will for the square in the city.

I have now stated, I believe, all the provisions of the will which are material to the discussion of that part of the case which respects the character of the institution.

The first question is, whether this devise can be sustained, otherwise than as a charity, and by that special aid and assistance by which courts of equity support gifts to charitable uses.

If the devise be a good limitation at law, if it require no exercise of the favor which is bestowed on privileged testaments, then there is already an end to the question. But I take it that this point is conceded. The devise is void, according to the general rules of law, on account of the uncertainty in the description of those who are intended to receive its benefits.

"Poor white male orphan children" is so loose a description, that no one can bring himself within the terms of the bequest, so as to say that it was made in his favor. No individual can acquire any right or interest; nobody, therefore, can come forward as a party, in a court of law, to claim participation in the gift. The bequest must stand, if it stand at all, on the peculiar rules which equitable jurisprudence applies to charities. This is clear.

I proceed, therefore, to submit, and most conscientiously to argue, a question, certainly one of the highest which this court has ever been called upon to consider, and one of the highest, and most important, in my opinion, ever likely to come before it. That question is, **whether, in the eye of equitable jurisprudence, this devise be a charity at all**. I deny that it is so. I maintain, that neither by judicial decisions nor by correct reasoning on general principles can this devise or bequest be regarded as a charity. This part of the argument is not affected by the particular judicial system of Pennsylvania, or the question of the power of her courts to uphold and administer charitable gifts. The question which I now propose respects the inherent, essential, and manifest character of the devise itself. In this respect, I wish to express myself clearly, and to be correctly and distinctly understood. What I have said I shall stand by, and endeavor to maintain; namely, that in the view of a court of equity this devise **is no charity at all**. It is no charity, because the plan of education proposed by Mr. Girard is derogatory to the Christian religion; tends to



weaken men's reverence for that religion, and their conviction of its authority and importance; and therefore, in its general character, tends to mischievous, and not to useful ends.

The proposed school is to be founded on plain and clear principles, and for plain and clear objects, of infidelity. This cannot well be doubted; and a gift, or devise, for such objects, is not a charity, and as such entitled to the well-known favor with which charities are received and upheld by the courts of Christian countries.

In the next place, the object of this bequest is against the public policy of the State of Pennsylvania, in which State Christianity is declared to be the law of the land. For that reason, therefore, as well as the other, the devise ought not to be allowed to take effect.

These are the two propositions which it is my purpose to maintain, on this part of the case.

This scheme of instruction begins by attempting to attach reproach and odium to the whole clergy of the country. It places a brand, a stigma, on every individual member of the profession, without an exception. No minister of the Gospel, of any denomination, is to be allowed to come within the grounds belonging to this school, on any occasion, or for any purpose whatever. They are all rigorously excluded, as if their mere presence might cause pestilence. We have heard it said that Mr. Girard, by this will, distributed his charity without distinction of sect or party. However that may be, Sir, he certainly has dealt out opprobrium to the whole profession of the clergy, without regard to sect or party.

By this will, no minister of the Gospel of any sect or denomination whatever can be authorized or allowed to hold any office within the college; and not only that, but no minister or clergyman of any sect can, for any purpose whatever, enter within the walls that are to surround this college. If a clergyman has a sick nephew, or a sick grandson, he cannot, upon any pretext, be allowed to visit him within the walls of the college. The provision of the will is express and decisive. Still less may a clergyman enter to offer consolation to the sick, or to unite in prayer with the dying.

Now, I will not arraign Mr. Girard or his motives for this. I will not inquire into Mr. Girard's opinions upon religion. But I feel bound to say, the occasion demands that I should say, that this is the most opprobrious, the most insulting and unmerited stigma, that ever was cast, or attempted to be cast, upon the preachers of Christianity, from north to south, from east to west, through the length and breadth of the land, in the history of the country. When have they deserved it? Where have they deserved it? How have they deserved it? They are not to be allowed even the ordinary rights of hospitality; not even to be permitted to put their foot over the threshold of this college! Sir, I take it upon myself to say, that in no country in the world, upon either continent, can there be found a body of ministers of the Gospel who perform so much service to man, in such a full spirit of self-denial, under so little encouragement from government of any kind, and under circumstances almost always much straitened and often distressed, as the ministers of the Gospel in the United States, of all denominations. They



form no part of any established order of religion; they constitute no hierarchy; they enjoy no peculiar privileges. In some of the States they are even shut out from all participation in the political rights and privileges enjoyed by their fellow-citizens. They enjoy no tithes, no public provision of any kind. Except here and there, in large cities, where a wealthy individual occasionally makes a donation for the support of public worship, what have they to depend upon? They have to depend entirely on the voluntary contributions of those who hear them.

And this body of clergymen has shown, to the honor of their own country and to the astonishment of the hierarchies of the Old World, that it is practicable in free governments to raise and sustain by voluntary contributions alone a body of clergymen, which, for devotedness to their sacred calling, for purity of life and character, for learning, intelligence, piety, and that wisdom which cometh from above, is inferior to none, and superior to most others.

I hope that our learned men have done something for the honor of our literature abroad. I hope that the courts of justice and members of the bar of this country have done something to elevate the character of the profession of the law. I hope that the discussions above (in Congress) have done something to meliorate the condition of the human race, to secure and extend the great charter of human rights, and to strengthen and advance the great principles of human liberty. But I contend that no literary efforts, no adjudications, no constitutional discussions, nothing that has been done or said in favor of the great interests of universal man, has done this country more credit, at home and abroad, than the establishment of our body of clergymen, their support by voluntary contributions, and the general excellence of their character for piety and learning. The great truth has thus been proclaimed and proved, a truth which I believe will in time to come shake all the hierarchies of Europe, that the voluntary support of such a ministry, under free institutions, is a practicable idea.

And yet every one of these, the Christian ministers of the United States, is by this devise denied the privileges which are at the same time open to the vilest of our race; every one is shut out from this, I had almost said *sanctum*, but I will not profane that word by such a use of it.

Did a man ever live that had a respect for the Christian religion, and yet had no regard for **any one** of its ministers? Did that system of instruction ever exist, which denounced the whole body of Christian teachers, and yet called itself a system of Christianity?

The learned counsel on the other side see the weak points of this case. They are not blind. They have, with the aid of their great learning, industry, and research, gone back to the time of Constantine, they have searched the history of the Roman emperors, the Dark Ages, and the intervening period, down to the settlement of these colonies; they have explored every nook and corner of religious and Christian history, to find out the various meanings and uses of Christian charity; and yet, with all their skill and all their research, they have not been able to discover any thing which has ever been regarded as a Christian



charity, that sets such an opprobrium upon the forehead of all its ministers. If, with all their endeavors, they can find any one thing which has been so regarded, **they may have their college**, and make the most of it. But the thing does not exist; it **never had a being**; history does not record it, common sense revolts at it. It certainly is not necessary for me to make an ecclesiastical argument in favor of this proposition. The thing is so plain, that it must instantly commend itself to your honors.

It has been said that Mr. Girard was charitable. I am not now going to controvert this. I hope he was. I hope he has found his reward. It has also been asked, "Cannot Mr. Girard be allowed to have his own will, to devise his property according to his own desire?" Certainly he can, in any legal devise, and the law will sustain him therein. But it is not for him to overturn the law of the land. The law cannot be altered to please Mr. Girard. He found that out, I believe, in two or three instances in his lifetime. Nor can the law be altered on account of the magnitude and munificence of the bounty. What is the value of that bounty, however great or munificent, which touches the very foundations of human society, which touches the very foundations of Christian charity, which touches the very foundations of public law, and the Constitution, and the whole welfare of the state? And now, let me ask, What is, in contemplation of law, "a charity"? The word has various significations. In the larger and broader sense, it means the kindly exercise of the social affections, all the good feelings which man entertains towards man. Charity is love. This is that charity of which St. Paul speaks, that charity which covereth the sins of men, "that suffereth all things, hopeth all things." In a more popular sense, charity is alms-giving or active benevolence.

But the question for your honors to decide here is, What is a charity, or a charitable use, in contemplation of law? To answer this inquiry, we are generally referred to the objects enumerated in the 43d of Elizabeth. The objects enumerated in that statute, and others analogous to them, are charities in the sense of equitable jurisprudence.

There is no doubt that a school of learning is a charity. It is one of those mentioned in the statutes. Such a school of learning as was contemplated by the statutes of Elizabeth is a charity; and all such have borne that name and character to this day. I mean to confine myself to that description of charity, the statute charity, and to apply it to this case alone.

The devise before us proposes to establish, as its main object, a school of learning, a college. There are provisions, of course, for lodging, clothing, and feeding the pupils, but all this is subsidiary. The great object is the instruction of the young; although it proposes to give the children better food and clothes and lodging, and proposes that the system of education shall be somewhat better than that which is usually provided for the poor and destitute in our public institutions generally.

The main object, then, is to establish a school of learning for children, beginning with them at a very tender age, and retaining them (namely, from six years to eighteen) till they are on the verge of manhood, when they will have expended more than one third part of the average duration of human life. For



if the college takes them at six, and keeps them till they are eighteen, a period of twelve years will be passed within its walls; more than a third part of the average of human life. These children, then, are to be taken almost before they learn their alphabet, and be discharged about the time that men enter on the active business of life. At six, many do not know their alphabet. John Wesley did not know a letter till after he was six years old, and his mother then took him on her lap, and taught him his alphabet at a single lesson. There are many parents who think that any attempt to instil the rudiments of education into the mind of a child at an earlier age, is little better than labor thrown away.

The great object, then, which Mr. Girard seemed to have in view, was to take these orphans at this very tender age, and to keep them within his walls until they were entering manhood. And this object I pray your honors steadily to bear in mind.

I never, in the whole course of my life, listened to any thing with more sincere delight, than to the remarks of my learned friend who opened this cause, on the nature and character of true charity. I agree with every word he said on that subject. I almost envy him his power of expressing so happily what his mind conceives so clearly and correctly. He is right when he speaks of it as an emanation from the Christian religion. He is right when he says that it has its origin in the word of God. He is right when he says that it was unknown throughout all the world till the first dawn of Christianity. He is right, pre-eminently right, in all this, as he was pre-eminently happy in his power of clothing his thoughts and feelings in appropriate forms of speech. And I maintain, that, in any institution for the instruction of youth, where the authority of God is disowned, and the duties of Christianity derided and despised, and its ministers shut out from all participation in its proceedings, there can no more be charity, true charity, found to exist, than evil can spring out of the BIBLE, error out of truth, or hatred and animosity come forth from the bosom of perfect love. No, Sir! No, Sir! If charity denies its birth and parentage, if it turns infidel to the great doctrines of the Christian religion, if it turns unbeliever, it is no longer charity! There is no longer charity, either in a Christian sense or in the sense of jurisprudence; for it separates itself from the fountain of its own creation.

There is nothing in the history of the Christian religion; there is nothing in the history of English law, either before or after the Conquest; there can be found no such thing as a school of instruction in a Christian land, from which the Christian religion has been, of intent and purpose, rigorously and opprobriously excluded, and yet such school regarded as a charitable trust or foundation. This is the first instance on record. I do not say that there may not be charity schools in which religious instruction is not provided. I need not go that length, although I take that to be the rule of the English law. But what I do say, and repeat, is, that a school for the instruction of the young, which sedulously and reproachfully excludes Christian knowledge, is no charity, either on principle or authority, and is not, therefore, entitled to the character of a charity in a court of equity. I have considered this



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proposition, and am ready to stand by it.

I will not say that there may not be a charity for instruction, in which there is no positive provision for the Christian religion. But I do say, and do insist, that there is no such thing in the history of religion, no such thing in the history of human law, as a charity, a school of instruction for children, from which the Christian religion and Christian teachers are excluded, as unsafe and unworthy intruders. Such a scheme is deprived of that which enters into the very essence of human benevolence, when that benevolence contemplates instruction, that is to say, religious knowledge, connected with human knowledge. It is this which causes it to be regarded as a charity; and by reason of this it is entitled to the special favor of the courts of law. This is the vital question which must be decided by this court. It is vital to the understanding of what the law is, it is vital to the validity of this devise. If this be true, if there can be no charity in that plan of education which opposes Christianity, then that goes far to decide this case. I take it that this court, in looking at this subject, will see the important bearing of this point upon it. The learned counsel said that the State of Pennsylvania was not an infidel State. It is true that she is not an infidel State. She has a Christian origin, a Christian code of laws, a system of legislation founded on nothing else, in many of its important bearings upon human society, than the belief of the people of Pennsylvania, their firm and sincere belief, in the divine authority and great importance of the truths of the Christian religion. And she should the more carefully seek to preserve them pure.

Now, let us look at the condition and prospects of these tender children, who are to be submitted to this experiment of instruction without Christianity. In the first place, they are orphans, have no parents to guide or instruct them in the way in which they should go, no father, no religious mother, to lead them to the pure fount of Christianity; **they are orphans**. If they were only poor, there might be somebody bound by ties of human affection to look after their spiritual welfare; to see that they imbibed no erroneous opinions on the subject of religion; that they run into no excessive improprieties of belief as well as conduct. The child would have its father or mother to teach it to lisp the name of its Creator in prayer, or hymn His praise. But in this experimental school of instruction, if the orphans have any friends or connections able to look after their welfare, it shuts them out. It is made the duty of the governors of the institution, on taking the child, so to make out the indentures of apprenticeship as to keep him from any after interference in his welfare on the part of guardians or relatives; to keep them from withdrawing him from the school, or interfering with his instruction whilst he is in the school, in any manner whatever.

The school or college is to be surrounded by high walls; there are to be two gates in these walls, and no more; they are to be of iron within, and iron bound or covered without; thus answering more to the description of a castle than a school-house. The children are to be thus guarded for twelve years in this, I do not mean to say a prison, nor do I mean to say that



this is exactly close confinement; but it is much closer confinement than ordinarily is met with, under the rules of any institution at present, and has a resemblance to the monastic institutions of past ages, rather than to any school for instruction at this period, at least in this country.

All this is to be within one great enclosure; all that is done for the bodily or mental welfare of the child is to be done within this great wall. It has been said that the children could attend public worship elsewhere. Where is the proof of this? There is no such provision in the devise; there is nothing said about it in any part of Mr. Girard's will; and I shall show presently that any such thing would be just as adverse to Mr. Girard's whole scheme, as it would be that the doctrines of Christianity should be preached within the walls of the college. These children, then, are taken before they know the alphabet. They are kept till the period of early manhood, and then sent out into the world to enter upon its business and affairs. By this time the character will have been stamped. For if there is any truth in the BIBLE, if there is any truth in those oracles which soar above all human authority, or if any thing be established as a general fact, by the experience of mankind, in this first third of human life the character is formed. And what sort of a character is likely to be made by this process, this experimental system of instruction?

I have read the two provisions of Mr. Girard's will in relation to this feature of his school. The first excludes the Christian religion and all its ministers from its walls. The second explains the whole principles upon which he purposes to conduct his school. It was to try an experiment in education, never before known to the Christian world. It had been recommended often enough among those who did not belong to the Christian world. But it was never known to exist, never adopted by anybody even professing a connection with Christianity. And I cannot do better, in order to show the tendency and object of this institution, than to read from a paper by Bishop White, which has been referred to by the other side.

In order to a right understanding of what was Mr. Girard's real intention and original design, we have only to read carefully the words of the clause I have referred to. He enjoins that no ministers of religion, of any sects, shall be allowed to enter his college, on any pretence whatever. Now, it is obvious, that by sects he means Christian sects. Any of the followers of Voltaire or D'Alembert may have admission into this school whenever they please, because they are not usually spoken of as "sects." The doors are to be opened to the opposers and revilers of Christianity, in every form and shape, and shut to its supporters. While the voice of the upholders of Christianity is never to be heard within the walls, the voices of those who impugn Christianity may be raised high and loud, till they shake the marble roof of the building. It is no less derogatory thus to exclude the one, and admit the other, than it would be to make a positive provision and all the necessary arrangements for lectures and lessons and teachers, for all the details of the doctrines of infidelity. It is equally derogatory, it is the same in principle, thus to shut the door to one party, and open the door to the other.



We must reason as to the probable results of such a system according to natural consequences. They say, on the other side, that infidel teachers will not be admitted in this school. How do they know that? What is the inevitable tendency of such an education as is here prescribed? What is likely to occur? The court cannot suppose that the trustees will act in opposition to the directions of the will. If they accept the trust, they must fulfil it, and carry out the details of Mr. Girard's plan. Now, what is likely to be the effect of this system on the minds of these children, thus left solely to its pernicious influence, with no one to care for their spiritual welfare in this world or the next? They are to be left entirely to the tender mercies of those who will try upon them this experiment of moral philosophy or philosophical morality. Morality without sentiment; benevolence towards man, without a sense of responsibility towards God; the duties of this life performed, without any reference to the life which is to come; this is Mr. Girard's theory of useful education.

Half of these poor children may die before the term of their education expires. Still, those who survive must be brought up imbued fully with the inevitable tendencies of the system.

It has been said that there may be lay preachers among them. Lay preachers! This is ridiculous enough in a country of Christianity and religion. [Here some one handed Mr. Webster a note.] A friend informs me that four of the principal religious sects in this country, the Episcopalians, Presbyterians, Methodists, and Baptists, allow no lay preachers; and these four constitute a large majority of the religious and Christian portion of the people of the United States. And, besides, lay preaching would be just as adverse to Mr. Girard's original object and whole plan as professional preaching, **provided it should be Christianity which should be preached.**

It is plain, as plain as language can be made, that he did not intend to allow the minds of these children to be troubled about religion of any kind, whilst they were within the college. And why? He himself assigns the reason. Because of the difficulty and trouble, he says, that might arise from the multitude of sects, and creeds, and teachers, and the various clashing doctrines and tenets advanced by the different preachers of Christianity. Therefore his desire as to these orphans is, that their minds should be kept free from all bias of any kind in favor of any description of Christian creed, till they arrived at manhood, and should have left the walls of his school.

Now, are not laymen equally sectarian in their views with clergymen? And would it not be just as easy to prevent sectarian doctrines from being preached by a clergyman, as from being taught by a layman? It is idle, therefore, to speak of lay preaching.

MR. SERGEANT here rose, and said that they on their side had not uttered one word about lay preaching. It was lay teaching they spoke of.

Well, I would just as soon take it that way as the other, **teaching** as preaching. Is not the teaching of laymen as sectarian as the preaching of clergymen? What is the difference between unlettered laymen and lettered clergymen in this



respect? Every one knows that laymen are as violent controversialists as clergymen, and the less informed the more violent. So this, while it is a little more ridiculous, is equally obnoxious. According to my experience, a layman is just as likely to launch out into sectarian views, and to advance clashing doctrines and violent, bigoted prejudices, as a professional preacher, and even more so. Every objection to professional religious instruction applies with still greater force to lay teaching. As in other cases, so in this, the greatest degree of candor is usually found accompanying the greatest degree of knowledge. Nothing is more apt to be positive and dogmatical than ignorance.

But there is no provision in any part of Mr. Girard's will for the introduction of any lay teaching on religious matters whatever. The children are to get their religion when they leave his school, and they are to have nothing to do with religion before they do leave it. They are then to choose their religious opinions, and not before.

MR. BINNEY. "Choose their tenets" is the expression.

Tenets are opinions, I believe. The mass of one's religious tenets makes up one's religion.

Now, it is evident that Mr. Girard meant to found a school of morals, without any reference to, or connection with, religion. But, after all, there is nothing original in this plan of his. It has its origin in a deistical source, but not from the highest school of infidelity. Not from Bolingbroke, or Shaftesbury, or Gibbon; not even from Voltaire or D'Alembert. It is from two persons who were probably known to Mr. Girard in the early part of his life; it is from Mr. Thomas Paine and Mr. Volney. Mr. Thomas Paine, in his "Age of Reason," says: "Let us devise means to establish schools of instruction, that we may banish the ignorance that the ancient *régime* of kings and priests has spread among the people. Let us propagate morality, unfettered by superstition."

MR. BINNEY. What do you get that from?

The same place that Mr. Girard got this provision of his will from, Paine's "Age of Reason." The same phraseology in effect is here. Paine disguised his real meaning, it is true. He said: "Let us devise means to establish schools to propagate morality, unfettered by **superstition**." Mr. Girard, who had no disguise about him, uses plain language to express the same meaning. In Mr. Girard's view, **religion** is just that thing which Mr. Paine calls **superstition**. "Let us establish schools of morality," said he, "unfettered by religious tenets. Let us give these children a system of pure morals before they adopt any religion." The ancient *régime* of which Paine spoke as obnoxious was that of kings and priests. That was the popular way he had of making any thing obnoxious that he wished to destroy. Now, if he had **merely** wished to get rid of the dogmas which he says were established by kings and priests, if he had no desire to abolish the Christian religion itself, he could have thus expressed himself: "Let us rid ourselves of the errors of kings and priests, and plant morality on the plain text of the Christian religion, with the simplest forms of religious worship."



I do not intend to leave this part of the cause, however, without a still more distinct statement of the objections to this scheme of instruction. This is due, I think, to the subject and to the occasion; and I trust I shall not be considered presumptuous, or as trenching upon the duties which properly belong to another profession. But I deem it due to the cause of Christianity to take up the notions of this scheme of Mr. Girard, and show how mistaken is the idea of calling it a charity. In the first place, then, I say, this scheme is derogatory to Christianity, because it rejects Christianity from the education of youth, by rejecting its teachers, by rejecting the ordinary agencies of instilling the Christian religion into the minds of the young. I do not say that, in order to make this a charity, there should be a positive provision for the teaching of Christianity, although, as I have already observed, I take that to be the rule in an English court of equity. But I need not, in this case, claim the whole benefit of that rule. I say it is derogatory, because there is a positive rejection of Christianity; because it rejects the ordinary means and agencies of Christianity. He who rejects the ordinary means of accomplishing an end, means to defeat that end itself, or else he has no meaning. And this is true, although the means originally be means of human appointment, and not attaching to or resting on any higher authority.

For example, if the New Testament had contained a set of principles of morality and religion, without reference to the means by which those principles were to be established, and if in the course of time a system of means had sprung up, become identified with the history of the world, become general, sanctioned by continued use and custom, then he who should reject those means would design to reject, and would reject, that morality and religion themselves.

This would be true in a case where the end rested on divine authority, and human agency devised and used the means. But if the means themselves be of divine authority also, then the rejection of them is a direct rejection of that authority.

Now, I suppose there is nothing in the New Testament more clearly established by the Author of Christianity, than the appointment of a Christian ministry. The world was to be evangelized, was to be brought out of darkness into light, by the influences of the Christian religion, spread and propagated by the instrumentality of man. A Christian ministry was therefore appointed by the Author of the Christian religion himself, and it stands on the same authority as any other part of his religion. When the lost sheep of the house of Israel were to be brought to the knowledge of Christianity, the disciples were commanded to go forth into all the cities, and to preach "that the kingdom of heaven is at hand." It was added, that whosoever would not receive them, nor hear their words, it should be more tolerable for Sodom and Gomorrha than for them. And after his resurrection, in the appointment of the great mission to the whole human race, the Author of Christianity commanded his disciples that they should "go into all the world, and preach the Gospel to every creature." This was one of his last commands; and one of his last promises was the assurance, "Lo, I am with you always, even to the end of the world!" I say, therefore, there



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is nothing set forth more authentically in the New Testament than the appointment of a Christian ministry; and he who does not believe this does not and cannot believe the rest.

It is true that Christian ministers, in this age of the world, are selected in different ways and different modes by different sects and denominations. But there are, still, ministers of all sects and denominations. Why should we shut our eyes to the whole history of Christianity? Is it not the preaching of ministers of the Gospel that has evangelized the more civilized part of the world? Why do we at this day enjoy the lights and benefits of Christianity ourselves? Do we not owe it to the instrumentality of the Christian ministry? The ministers of Christianity, departing from Asia Minor, traversing Asia, Africa, and Europe, to Iceland, Greenland, and the poles of the earth, suffering all things, enduring all things, hoping all things, raising men everywhere from the ignorance of idol worship to the knowledge of the true God, and everywhere bringing life and immortality to light through the Gospel, have only been acting in obedience to the Divine instruction; they were commanded to go forth, and they have gone forth, and they still go forth. They have sought, and they still seek, to be able to preach the Gospel to every creature under the whole heaven. And where was Christianity ever received, where were its truths ever poured into the human heart, where did its waters, springing up into everlasting life, ever burst forth, except in the track of a Christian ministry? Did we ever hear of an instance, does history record an instance, of any part of the globe Christianized by lay preachers, or "lay teachers"? And, descending from kingdoms and empires to cities and countries, to parishes and villages, do we not all know, that wherever Christianity has been carried, and wherever it has been taught, by human agency, that agency was the agency of ministers of the Gospel? It is all idle, and a mockery, to pretend that any man has respect for the Christian religion who yet derides, reproaches, and stigmatizes all its ministers and teachers. It is all idle, it is a mockery, and an insult to common sense, to maintain that a school for the instruction of youth, from which Christian instruction by Christian teachers is sedulously and rigorously shut out, is not deistical and infidel both in its purpose and in its tendency. I insist, therefore, that this plan of education is, in this respect, derogatory to Christianity, in opposition to it, and calculated either to subvert or to supersede it.

In the next place, this scheme of education is derogatory to Christianity, because it proceeds upon the presumption that the Christian religion is not the only true foundation, or any necessary foundation, of morals. The ground taken is, that religion is not necessary to morality, that benevolence may be insured by habit, and that all the virtues may nourish, and be safely left to the chance of flourishing, without touching the waters of the living spring of religious responsibility. With him who thinks thus, what can be the value of the Christian revelation? So the Christian world has not thought; for by that Christian world, throughout its broadest extent, it has been, and is, held as a fundamental truth, that religion is the only solid basis of morals, and that moral instruction not resting



on this basis is only a building upon sand. And at what age of the Christian era have those who professed to teach the Christian religion, or to believe in its authority and importance, not insisted on the absolute necessity of inculcating its principles and its precepts upon the minds of the young? In what age, by what sect, where, when, by whom, has religious truth been excluded from the education of youth? Nowhere; never. Everywhere, and at all times, it has been, and is, regarded as essential. It is of the essence, the vitality, of useful instruction. From all this Mr. Girard dissents. His plan denies the necessity and the propriety of religious instruction as a part of the education of youth. He dissents, not only from all the sentiments of Christian mankind, from all common conviction, and from the results of all experience, but he dissents also from still higher authority, the word of God itself. My learned friend has referred, with propriety, to one of the commands of the Decalogue; but there is another, a first commandment, and that is a precept of religion, and it is in subordination to this that the moral precepts of the Decalogue are proclaimed. This first great commandment teaches man that there is one, and only one, great First Cause, one, and only one, proper object of human worship. This is the great, the ever fresh, the overflowing fountain of all revealed truth. Without it, human life is a desert, of no known termination on any side, but shut in on all sides by a dark and impenetrable horizon. Without the light of this truth, man knows nothing of his origin, and nothing of his end. And when the Decalogue was delivered to the Jews, with this great announcement and command at its head, what said the inspired lawgiver? that it should be kept from children? that it should be reserved as a communication fit only for mature age? Far, far otherwise. "And these words, which I command thee this day, shall be in thy heart. And thou shalt teach them diligently unto thy children, and shall talk of them when thou sittest in thy house, and when thou walkest by the way, when thou liest down, and when thou risest up." There is an authority still more imposing and awful. When little children were brought into the presence of the Son of God, his disciples proposed to send them away; but he said, "Suffer little children to come unto me." Unto **me**; he did not send them first for lessons in morals to the schools of the Pharisees, or to the unbelieving Sadducees, nor to read the precepts and lessons **phylacteried** on the garments of the Jewish priesthood; he said nothing of different creeds or clashing doctrines; but he opened at once to the youthful mind the everlasting fountain of living waters, the only source of eternal truths: "Suffer little children to come **unto me**." And that injunction is of perpetual obligation. It addresses itself to-day with the same earnestness and the same authority which attended its first utterance to the Christian world. It is of force everywhere, and at all times. It extends to the ends of the earth, it will reach to the end of time, always and everywhere sounding in the ears of men, with an emphasis which no repetition can weaken, and with an authority which nothing can supersede: "Suffer little children to come unto me."

And not only my heart and my judgment, my belief and my conscience, instruct me that this great precept should be



obeyed, but the idea is so sacred, the solemn thoughts connected with it so crowd upon me, it is so utterly at variance with this system of philosophical **morality** which we have heard advocated, that I stand and speak here in fear of being influenced by my feelings to exceed the proper line of my professional duty. Go thy way at this time, is the language of philosophical morality, and I will send for thee at a more convenient season. This is the language of Mr. Girard in his will. In this there is neither religion nor reason.

The earliest and the most urgent intellectual want of human nature is the knowledge of its origin, its duty, and its destiny. "Whence am I, what am I, and what is before me?" This is the cry of the human soul, so soon as it raises its contemplation above visible, material things.

When an intellectual being finds himself on this earth, as soon as the faculties of reason operate, one of the first inquiries of his mind is, "Shall I be here always?" "Shall I live here for ever?" And reasoning from what he sees daily occurring to others, he learns to a certainty that his state of being must one day be changed. I do not mean to deny, that it may be true that he is created with this consciousness; but whether it be consciousness, or the result of his reasoning faculties, man soon learns that he must die. And of all sentient beings, he alone, so far as we can judge, attains to this knowledge. His Maker has made him capable of learning this. Before he knows his origin and destiny, he knows that he is to die. Then comes that most urgent and solemn demand for light that ever proceeded, or can proceed, from the profound and anxious broodings of the human soul. It is stated, with wonderful force and beauty, in that incomparable composition, the book of Job: "For there is hope of a tree, if it be cut down, that it will sprout again, and that the tender branch thereof will not cease; that, through the scent of water, it will bud, and bring forth boughs like a plant. **But if a man die, shall he live again?**" And that question nothing but God, and the religion of God, can solve. Religion does solve it, and teaches every man that he is to live again, and that the duties of this life have reference to the life which is to come. And hence, since the introduction of Christianity, it has been the duty, as it has been the effort, of the great and the good, to sanctify human knowledge, to bring it to the fount, and to baptize learning into Christianity; to gather up all its productions, its earliest and its latest, its blossoms and its fruits, and lay them all upon the altar of religion and virtue.

Another important point involved in this question is, What becomes of the Christian Sabbath, in a school thus established? I do not mean to say that this stands exactly on the same authority as the Christian religion, but I mean to say that the observance of the Sabbath is a part of Christianity in all its forms. All Christians admit the observance of the Sabbath. All admit that there is a Lord's day, although there may be a difference in the belief as to which is the right day to be observed. Now, I say that in this institution, under Mr. Girard's scheme, the ordinary observance of the Sabbath could not take place, because the ordinary means of observing it are excluded. I know that I shall be told here, also, that lay



teachers would come in again; and I say again, in reply, that, where the ordinary means of attaining an end are excluded, the intention is to exclude the end itself. There can be no Sabbath in this college, there can be no religious observance of the Lord's day; for there are no means for attaining that end. It will be said, that the children would be permitted to go out. There is nothing seen of this permission in Mr. Girard's will. And I say again, that it would be just as much opposed to Mr. Girard's whole scheme to allow these children to go out and attend places of public worship on the Sabbath day, as it would be to have ministers of religion to preach to them within the walls; because, if they go out to hear preaching, they will hear just as much about religious controversies, and clashing doctrines, and more, than if appointed preachers officiated in the college. His object, as he states, was to keep their minds free from all religious doctrines and sects, and he would just as much defeat his ends by sending them out as by having religious instruction within. Where, then, are these little children to go? Where can they go to learn the truth, to reverence the Sabbath? They are far from their friends, they have no one to accompany them to any place of worship, no one to show them the right from the wrong course; their minds must be kept clear from all bias on the subject, and they are just as far from the ordinary observance of the Sabbath as if there were no Sabbath day at all. And where there is no observance of the Christian Sabbath there will of course be no public worship of God.

In connection with this subject I will observe, that there has been recently held a large convention of clergymen and laymen in Columbus, Ohio, to lead the minds of the Christian public to the importance of a more particular observance of the Christian Sabbath; and I will read, as part of my argument, an extract from their address, which bears with peculiar force upon this case.

"It is alike obvious that the Sabbath exerts its salutary power by making the population acquainted with the being, perfections, and laws of God; with our relations to him as his creatures, and our obligations to him as rational, accountable subjects, and with our character as sinners, for whom his mercy has provided a Saviour; under whose government we live to be restrained from sin and reconciled to God, and fitted by his word and spirit for the inheritance above."

"It is by the reiterated instruction and impression which the Sabbath imparts to the population of a nation, by the moral principle which it forms, by the conscience which it maintains, by the habits of method, cleanliness, and industry it creates, by the rest and renovated vigor it bestows on exhausted human nature, by the lengthened life and higher health it affords, by the holiness it inspires, and cheering hopes of heaven, and the protection and favor of God, which its observance insures, that the Sabbath is rendered the moral conservator of nations.

"The omnipresent influence the Sabbath exerts, however,



by no secret charm or compendious action, upon masses of unthinking minds; but by arresting the stream of worldly thoughts, interests, and affections, stopping the din of business, unlading the mind of its cares and responsibilities, and the body of its burdens, while God speaks to men, and they attend, and hear, and fear, and learn to do his will.

"You might as well put out the sun, and think to enlighten the world with tapers, destroy the attraction of gravity, and think to wield the universe by human powers, as to extinguish the moral illumination of the Sabbath, and break this glorious main-spring of the moral government of God."

And I would ask, Would any Christian man consider it desirable for his orphan children, after his death, to find refuge within this asylum, under all the circumstances and influences which will necessarily surround its inmates? Are there, or will there be, any Christian parents who would desire that their children should be placed in this school, to be for twelve years exposed to the pernicious influences which must be brought to bear on their minds? I very much doubt if there is any Christian father who hears me this day, and I am quite sure that there is no Christian mother, who, if called upon to lie down on the bed of death, although sure to leave her children as poor as children can be left, who would not rather trust them, nevertheless, to the Christian charity of the world, however uncertain it has been said to be, than place them where their physical wants and comforts would be abundantly attended to, but away from the solaces and consolations, the hopes and the grace, of the Christian religion. She would rather trust them to the mercy and kindness of that spirit, which, when it has nothing else left, gives a cup of cold water in the name of a disciple; to that spirit which has its origin in the fountain of all good, and of which we have on record an example the most beautiful, the most touching, the most intensely affecting, that the world's history contains, I mean the offering of the poor widow, who threw her two mites into the treasury. "And he looked up, and saw the rich men casting their gifts into the treasury; and he saw also a certain poor widow casting in thither two mites. And he said, Of a truth I say unto you, that this poor widow hath cast in more than they all; for all these have, of their abundance, cast in unto the offerings of God: but she of her penury hath cast in all the living that she had." What more tender, more solemnly affecting, more profoundly pathetic, than this charity, this offering to God, of a farthing! We know nothing of her name, her family, or her tribe. We only know that she was a poor woman, and a widow, of whom there is nothing left upon record but this sublimely simple story, that, when the rich came to cast their proud offerings into the treasury, this poor woman came also, and cast in her two mites, which made a farthing! And that example, thus made the subject of divine commendation, has been read, and told, and gone abroad everywhere, and sunk deep into a hundred millions of hearts, since the commencement of the Christian era, and has done more good than could be accomplished by a thousand marble palaces, because it was charity mingled



with true benevolence, given in the fear, the love, the service, and honor of God; because it was charity, that had its origin in religious feeling; because it was a gift to the honor of God! Cases have come before the courts, of bequests, in last wills, made or given to God, without any more specific direction; and these bequests have been regarded as creating charitable uses. But can that be truly called a charity which flies in the face of all the laws of God and all the usages of Christian man? I arraign no man for mixing up a love of distinction and notoriety with his charities. I blame not Mr. Girard because he desired to raise a splendid marble palace in the neighborhood of a beautiful city, that should endure for ages, and transmit his name and fame to posterity. But his school of learning is not to be valued, because it has not the chastening influences of true religion; because it has no fragrance of the spirit of Christianity. It is not a charity, for it has not that which gives to a charity for education its chief value. It will, therefore, soothe the heart of no Christian parent, dying in poverty and distress, that those who owe to him their being may be led, and fed, and clothed by Mr. Girard's bounty, at the expense of being excluded from all the means of religious instruction afforded to other children, and shut up through the most interesting period of their lives in a seminary without religion, and with moral sentiments as cold as its own marble walls.

I now come to the consideration of the second part of this clause in the will, that is to say, the reasons assigned by Mr. Girard for making these restrictions with regard to the ministers of religion; and I say that these are much more derogatory to Christianity than the main provision itself, excluding them. He says that there are such a multitude of sects and such diversity of opinion, that he will exclude all religion and all its ministers, in order to keep the minds of the children free from clashing controversies. Now, does not this tend to subvert all belief in the utility of teaching the Christian religion to youth at all? Certainly, it is a broad and bold denial of such utility. To say that the evil resulting to youth from the differences of sects and creeds overbalances all the benefits which the best education can give them, what is this but to say that the branches of the tree of religious knowledge are so twisted, and twined, and commingled, and all run so much into and over each other, that there is therefore no remedy but to lay the axe at the root of the tree itself? It means that, and nothing less! Now, if there be any thing more derogatory to the Christian religion than this, I should like to know what it is. In all this we see the attack upon religion itself, made on its ministers, its institutions, and its diversities. And that is the objection urged by all the lower and more vulgar schools of infidelity throughout the world. In all these schools, called schools of Rationalism in Germany, Socialism in England, and by various other names in various countries which they infest, this is the universal cant. The first step of all these philosophical moralists and regenerators of the human race is to attack the agency through which religion and Christianity are administered to man. But in this there is nothing new or original. We find the same mode of attack and remark in Paine's "Age of Reason."



At page 336 he says: "The Bramin, the follower of Zoroaster, the Jew, the Mahometan, the Church of Rome, the Greek Church, the Protestant Church, split into several hundred contradictory sectaries, preaching, in some instances, damnation against each other, all cry out, 'Our holy religion!'"

We find the same view in Volney's "Ruins of Empires." Mr. Volney arrays in a sort of semicircle the different and conflicting religions of the world. "And first," says he, "surrounded by a group in various fantastic dresses, that confused mixture of violet, red, white, black, and speckled garments, with heads shaved, with tonsures, or with short hairs, with red hats, square bonnets, pointed mitres, or long beards, is the standard of the Roman Pontiff. On his right you see the Greek Pontiff, and on the left are the standards of two recent chiefs (Luther and Calvin), who, shaking off a yoke that had become tyrannical, had raised altar against altar in their reform, and wrested half of Europe from the Pope. Behind these are the subaltern sects, subdivided from the principal divisions. The Nestorians, Eutychians, Jacobites, Iconoclasts, Anabaptists, Presbyterians, Wickliffites, Osiandrians, Manicheans, Pietists, Adamites, the Contemplatives, the Quakers, the Weepers, and a hundred others, all of distinct parties, persecuting when strong, tolerant when weak, hating each other in the name of the God of peace, forming such an exclusive heaven in a religion of universal charity, damning each other to pains without end in a future state, and realizing in this world the imaginary hell of the other."

Can it be doubted for an instant that sentiments like these are derogatory to the Christian religion? And yet on grounds and reasons **exactly these**, not **like** these, but **EXACTLY** these, Mr. Girard founds his excuse for excluding Christianity and its ministers from his school. He is a tame copyist, and has only raised marble walls to perpetuate and disseminate the principles of Paine and of Volney. It has been said that Mr. Girard was in a difficulty; that he was the judge and disposer of his own property. We have nothing to do with his difficulties. It has been said that he must have done as he did do, because there could be no agreement otherwise. Agreement? among whom? about what? He was at liberty to do what he pleased with his own. He had to consult no one as to what he should do in the matter. And if he had wished to establish such a charity as might obtain the especial favor of the courts of law, he had only to frame it on principles not hostile to the religion of the country.

But the learned gentleman went even further than this, and to an extent that I regretted; he said that there was as much dispute about the BIBLE as about any thing else in the world. No, thank God, that is not the case!

MR. BINNEY. The disputes about the meaning of words and passages; you will admit that?

Well, there is a dispute about the translation of certain words; but if this be true, there is just as much dispute about it out of Mr. Girard's institution as there would be in it. And if this plan is to be advocated and sustained, why does not every man keep his children from attending all places of public worship until they are over eighteen years of age? He says that a prudent parent keeps his child from the influence of sectarian



doctrines, by which I suppose him to mean those tenets that are opposed to his own. Well, I do not know but what that plan is as likely to make bigots as it is to make any thing else. I grant that the mind of youth should be kept pliant, and free from all undue and erroneous influences; that it should have as much play as is consistent with prudence; but put it where it can obtain the elementary principles of religious truth; at any rate, those broad and general precepts and principles which are admitted by all Christians. But here in this scheme of Mr. Girard, all sects and all creeds are denounced. And would not a prudent father rather send his child where he could get instruction under any form of the Christian religion, than where he could get none at all? There are many instances of institutions, professing one leading creed, educating youths of different sects. The Baptist college in Rhode Island receives and educates youths of all religious sects and all beliefs. The colleges all over New England differ in certain minor points of belief, and yet that is held to be no ground for excluding youth with other forms of belief, and other religious views and sentiments.

But this objection to the multitude and differences of sects is but the old story, the old infidel argument. It is notorious that there are certain great religious truths which are admitted and believed by all Christians. All believe in the existence of a God. All believe in the immortality of the soul. All believe in the responsibility, in another world, for our conduct in this. All believe in the divine authority of the New Testament. Dr. Paley says that a single word from the New Testament shuts up the mouth of human questioning, and excludes all human reasoning. And cannot all these great truths be taught to children without their minds being perplexed with clashing doctrines and sectarian controversies? Most certainly they can. And, to compare secular with religious matters, what would become of the organization of society, what would become of man as a social being, in connection with the social system, if we applied this mode of reasoning to him in his social relations? We have a constitutional government, about the powers, and limitations, and uses of which there is a vast amount of differences of belief. Your honors have a body of laws, now before you, in relation to which differences of opinion, almost innumerable, are daily spread before the courts; in all these we see clashing doctrines and opinions advanced daily, to as great an extent as in the religious world.

Apply the reasoning advanced by Mr. Girard to human institutions, and you will tear them all up by the root; as you would inevitably tear all divine institutions up by the root, if such reasoning is to prevail. At the meeting of the first Congress there was a doubt in the minds of many of the propriety of opening the session with prayer; and the reason assigned was, as here, the great diversity of opinion and religious belief. At length Mr. Samuel Adams, with his gray hairs hanging about his shoulders, and with an impressive venerableness now seldom to be met with, (I suppose owing to the difference of habits,) rose in that assembly, and, with the air of a perfect Puritan, said that it did not become men, professing to be Christian men, who had come together for solemn deliberation in the hour of their extremity, to say that there was so wide a difference in



their religious belief, that they could not, as one man, bow the knee in prayer to the Almighty, whose advice and assistance they hoped to obtain. Independent as he was, and an enemy to all prelacy as he was known to be, he moved that the Rev. Mr. Duché, of the Episcopal Church, should address the Throne of Grace in prayer. And John Adams, in a letter to his wife, says that he never saw a more moving spectacle. Mr. Duché read the Episcopal service of the Church of England, and then, as if moved by the occasion, he broke out into extemporaneous prayer. And those men, who were then about to resort to force to obtain their rights, were moved to tears; and floods of tears, Mr. Adams says, ran down the cheeks of the pacific Quakers who formed part of that most interesting assembly. Depend upon it, where there is a spirit of Christianity, there is a spirit which rises above forms, above ceremonies, independent of sect or creed, and the controversies of clashing doctrines.

The consolations of religion can never be administered to any of these sick and dying children in this college. It is said, indeed, that a poor, dying child can be carried out beyond the walls of the school. He can be carried out to a hostelry, or hovel, and there receive those rites of the Christian religion which cannot be performed within those walls, even in his dying hour! Is not all this shocking? What a stricture is it upon this whole scheme! What an utter condemnation! A dying youth cannot receive religious solace within this seminary of learning!

But, it is asked, what could Mr. Girard have done? He could have done, as has been done in Lombardy by the Emperor of Austria, as my learned friend has informed us, where, on a large scale, the principle is established of teaching the elementary principles of the Christian religion, of enforcing human duties by divine obligations, and carefully abstaining in all cases from interfering with sects or the inculcation of sectarian doctrines. How have they done in the schools of New England? There, as far as I am acquainted with them, the great elements of Christian truth are taught in every school. The Scriptures are read, their authority taught and enforced, their evidences explained, and prayers usually offered.

The truth is, that those who really value Christianity, and believe in its importance, not only to the spiritual welfare of man, but to the safety and prosperity of human society, rejoice that in its revelations and its teachings there is so much which mounts above controversy, and stands on universal acknowledgment. While many things about it are disputed or are dark, they still plainly see its foundation, and its main pillars; and they behold in it a sacred structure, rising up to the heavens. They wish its general principles, and all its great truths, to be spread over the whole earth. But those who do not value Christianity, nor believe in its importance to society or individuals, cavil about sects and schisms, and ring monotonous changes upon the shallow and so often refuted objections founded on alleged variety of discordant creeds and clashing doctrines. I shall close this part of my argument by reading extracts from an English writer, one of the most profound thinkers of the age, a friend of reformation in the government and laws, John Foster, the friend and associate of Robert Hall. Looking forward to the abolition of the present dynasties of the Old World, and



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desirous to see how the order and welfare of society is to be preserved in the absence of present conservative principles, he says:-

"Undoubtedly the zealous friends of popular education account knowledge valuable absolutely, as being the apprehension of things as they are; a prevention of delusions; and so far a fitness for right volitions. But they consider religion (besides being itself the primary and infinitely the most important part of knowledge) as a principle indispensable for securing the full benefit of all the rest. It is desired, and endeavored, that the understandings of these opening minds may be taken possession of by just and solemn ideas of their relation to the Eternal Almighty Being; that they may be taught to apprehend it as an awful reality, that they are perpetually under his inspection; and, as a certainty, that they must at length appear before him in judgment, and find in another life the consequences of what they are in spirit and conduct here. It is to be impressed on them, that his will is the supreme law, that his declarations are the most momentous truth known on earth, and his favor and condemnation the greatest good and evil. Under an ascendancy of this divine wisdom it is, that their discipline in any other knowledge is designed to be conducted; so that nothing in the mode of their instruction may have a tendency contrary to it, and every thing be taught in a manner recognizing the relation with it, as far as shall consist with a natural, unforced way of keeping the relation in view. Thus it is sought to be secured, that, as the pupil's mind grows stronger, and multiplies its resources, and he therefore has necessarily more power and means for what is wrong, there may be luminously presented to him, as if celestial eyes visibly beamed upon him, the most solemn ideas that can enforce what is right."

"Such is the discipline meditated for preparing the subordinate classes to pursue their individual welfare, and act their part as members of the community...."

"All this is to be taught, in many instances directly, in others by reference for confirmation, from the Holy Scriptures, from which authority will also be impressed, all the while, the principles of religion. And religion, while its grand concern is with the state of the soul towards God and eternal interests, yet takes every principle and rule of morals under its peremptory sanction; making the primary obligation and responsibility be towards God, of every thing that is a duty with respect to men. So that, with the subjects of this education, the sense of **propriety** shall be **conscience**; the consideration of how they ought to be regulated in their conduct as a part of the community shall be the recollection that their Master in heaven dictates the laws of that conduct, and will judicially



hold them amenable for every part of it."

"And is not a discipline thus addressed to the purpose of fixing religious principles in ascendancy, as far as that difficult object is within the power of discipline, and of infusing a salutary tincture of them into whatever else is taught, the right way to bring up citizens faithful to all that deserves fidelity in the social compact?...

"Lay hold on the myriads of juvenile spirits before they have time to grow up through ignorance, into a reckless hostility to social order; train them to sense and good morals; inculcate the principles of religion, simply and solemnly, as religion, as a thing directly of divine dictation, and not as if its authority were chiefly in virtue of human institutions; let the higher orders, generally, make it evident to the multitude that they are desirous to raise them in value, and promote their happiness; and then, **whatever** the demands of the people as a body, thus improving in understanding and sense of justice, shall come to be, and **whatever** modification their preponderance may ultimately enforce on the great social arrangements, it will be infallibly certain that there never **can** be a love of disorder, an insolent anarchy, a prevailing spirit of revenge and devastation. Such a conduct of the ascendent ranks would, in this nation at least, secure that, as long as the world lasts, there never would be any formidable commotion, or violent sudden changes. All those modifications of the national economy to which an improving people would aspire, and would deserve to obtain, would be gradually accomplished, in a manner by which no party would be wronged, and all would be the happier."⁹⁹

I not only read this for the excellence of its sentiments and their application to the subject, but because they are the results of the profound meditations of a man who is dealing with popular ignorance. Desirous of, and expecting, a great change in the social system of the Old World, he is anxious to discover that conservative principle by which society can be kept together when crowns and mitres shall have no more influence. And he says that the only conservative principle must be, and is, RELIGION! the authority of God! his revealed will! and the influence of the teaching of the ministers of Christianity!

Mr. Webster here stated that he would, on Monday, bring forward certain references and legal points bearing on this view of the case.

The court then adjourned. [There would follow two more days of argument.]

99. Foster's Essay on the Evils of Popular Ignorance, Section IV.



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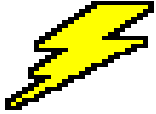
March 8, Friday: The [Concord Freeman](#) reported the rain of flesh and blood that had occurred in Jersey City, New Jersey on February 20, Tuesday, 1844:

[WALDEN](#): Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness.... At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of Nature. We must be refreshed by the sight of inexhaustible vigor, vast and Titanic features, the seacoast with its wrecks, the wilderness with its living and its decaying trees, the thunder cloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.... I love to see that Nature is so rife with life that myriads can be afforded to be sacrificed and suffered to prey on one another; that tender organizations can be so serenely squashed out of existence like pulp, – tadpoles which herons gobble up, and tortoises and toads run over in the road; and that sometimes it has rained flesh and blood!

RAINS OF BLOOD, &C.

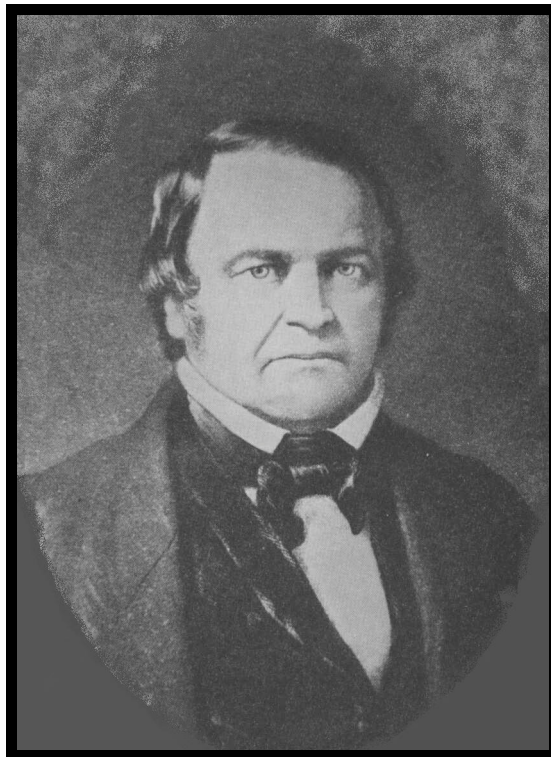
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March 21, Thursday: The 1st “Great Disappointment.” Perhaps a hundred thousand [Millerite](#) “adventists” were kept waiting all day and all night in white nightshirts and bedsheets, on hills and on their rooftops and on specially constructed roofless church platforms, for the Second Coming of Christ that the Reverend [William Miller](#) of Pittsfield had been predicting since 1831. At the rosy rays of dawn the earth had not ceased to exist, fancy that.

SEEDS: Who could believe in prophecies of Daniel or of Miller that the world would end this summer, while one milkweed with faith matured its seeds?



(Gould, Stephen Jay. QUESTIONING THE MILLENNIUM. NY: Harmony Books, 1997, page 49;
Festinger, Leon et al. WHEN PROPHECY FAILS. Minneapolis MN: U of Minnesota P, 1956, page 16-17)

MILLENNIALISM

The earth did not cease to exist, so their leader recalculated and reset the event to October 22. One disciple, according to [Waldo Emerson](#), stated that although they expected the second advent of the Lord in 1843, “if there is any error in his computation, –he shall look for him until he comes.”



“I would not run round a corner
to see the world blow up.”
– [Henry Thoreau](#),
“LIFE WITHOUT PRINCIPLE”



September: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

165	1844	Sept.	18.43706 2.47595 2.50462	209 11 49 63 53 63 56 31	50 18 40 0.342 35 342 37 46	100 58 41 16 278 42 16 278 41 15	11 16 56 2 54 46 2 54 27	1.690232 1.186249 1.185387	0.5485724 0.6171573 0.6158599	7.245 5.459 5.421	D D D	Argelander. Nicolai. Hind.
No.	Date.	Greenwich M. S. T. of Peri- helion Passage.	Longitude of Ascend- ing Node.	Longitude of Perihelion.	Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Direction.	Name of Computer.	
165	A. D. 1844	N. S. Sept. 2.45431 2.59311	63 53 63 47 18	20 342 34 342 56 5	10 278 40 279 8 47	50 2 46 1.182616	2 55 2 2 54 46	1.186545 1.182616	0.6186103 0.6019600	5.488 5.121	D R D D D	Goldschmidt. Faye. Hind. Hind. Hind.
166	1844	Oct. 17.33613	31 43 16	180 28 21	211 14 55	48 36 22	0.8552995					
167	1844	Dec. 13.75660 13.68294	119 39 44 118 27 35	294 10 6 296 4 43	174 30 22 177 37 8	45 7 8 45 36 34	0.2351532 0.2512598	0.9804300	41.46			

SKY EVENT

October: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

No.	Date.	Greenwich M. S. T. of Peri- helion Passage.	Longitude of Ascend- ing Node.	Longitude of Perihelion.	Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Direction.	Name of Computer.
	A. D.	N. S.	" ' "	" ' "	" ' "	" ' "			y.		
165	1844	Sept. 2.45431	63 53 20	342 34 10	278 40 50	2 55 2	1.186545	0.6186103	5.488	D	Goldschmidt.
		2.59311	63 47 18	342 56 5	279 8 47	2 54 46	1.182616	0.6019600	5.121	D	Faye.
166	1844	Oct. 17.33613	31 43 16	180 28 21	211 14 55	48 36 22	0.8552995			R	Hind.
167	1844	Dec. 13.75660	119 39 44	294 10 6	174 30 22	45 7 8	0.2351532	0.9804300	41.46	D	Hind.
		13.68294	118 27 35	296 4 43	177 37 8	45 36 34	0.2512598			D	Hind.

SKY EVENT

October 9, Wednesday: In Nauvoo, Illinois, [Brigham Young](#) “got married with” Rebecca Holman.

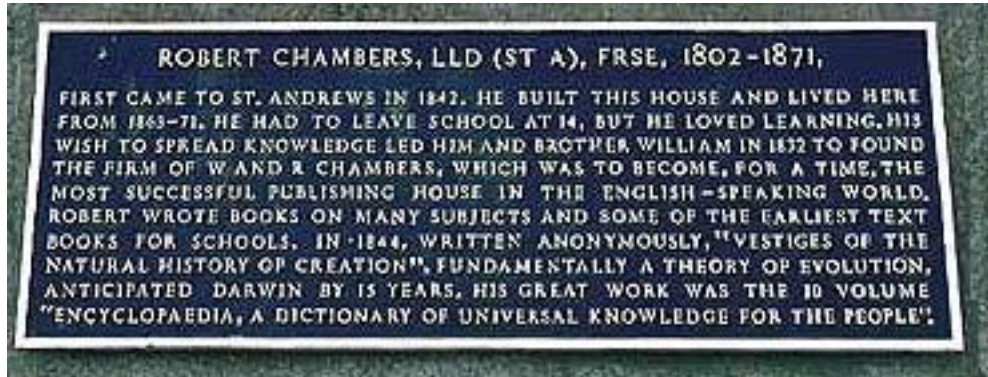


Late in the previous evening, walking in a plowed field near Coblenz, Germany, two men had observed a luminous object to fall from the sky with a crash at a distance of apparently some 20 yards. Although they had been unable to find anything in the dark, they had marked that spot, and when they returned to their marker in the field early upon this morning, what they saw was not the stony meteorite which they had been expecting but instead a gray mass which, when they poked at it with a stick, shook like gelatin. Unfortunately, according to the Reports of the British Association, the men did not attempt to preserve this jelly-like find.

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Mid-October: The anonymous publication [VESTIGES OF THE NATURAL HISTORY OF CREATION](#), which eventually would turn out to have been by [Robert Chambers](#), took what [Henry Thoreau](#) would accept as one of the



“wider views of the universe,” in allowing that since God’s law extended across the entire starry cosmos, we might legitimately hypothesize that elsewhere, circling any number of strange distant stars, there might well be other earths filled with other lives than ours here beside the star known as Sol:

[WALDEN](#): We might try our lives by a thousand simple tests; as, for instance, that the same sun which ripens my beans illumines at once a system of earths like ours. If I had remembered this it would have prevented some mistakes. This was not the light in which I hoed them. The stars are the apexes of what wonderful triangles! What distant and different beings in the various mansions of the universe are contemplating the same one at the same moment! Nature and human life are as various as our several constitutions. Who shall say what prospect life offers to another? Could a greater miracle take place than for us to look through each other’s eyes for an instant?

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Finding himself unable to overlook the manifest evidences of waste and cruelty in nature, Chambers was hypothesizing anonymously that God must have established two entirely separate sets of laws, one physical and the other moral, codes quite independent of one another, so that “Obedience to each gives only its own proper advantage, not the advantage proper to the other.”

This was of course being attacked as godlessness and so the publication would sell out four editions in seven months. In this year [Charles Darwin](#) was drafting an essay on his development theory, a theory very different in every particular, but he would not publish about this for some time either under his name or anonymously. All Thoreau was able to know of Darwin’s work therefore, at this point, was what he was able to read in the published journal of H.M.S. *Beagle*:



[Bear in mind that these *BEAGLE* volumes carry not only the name of Darwin on their spine, but also Phillip Parker King and Robert FitzRoy.]

As you remember, Thoreau would later make a passing remark in CAPE COD about this reading of Darwin:

Charles Darwin was assured that the roar of the surf on the coast of Chile, after a heavy gale, could be heard at night a distance of "21 sea miles across a hilly and wooded country."



One thing the readers of this anonymous volume could tell for sure about its author, was that he or she was a believer in [phrenology](#). Phrenological studies were revealing that on average, the brain of a female would weigh four ounces less than the brain of a male. How then could a woman, on average, possibly be of as strong a mind as her male counterpart? No wonder men are dominant! A woman's rationality, since it was not as robust as a man's, would more readily yield to her body and to her emotionality — something which anyway we can observe happening every day. (Had the gender politics of the era been reversed, we may notice, the opposite conclusions could have been derived from such period scientific "observations." Notice that in our present-day computer CPUs, speed of computation is inversely proportional to size — the more closely the transistors are packed, the shorter the wires between them, the greater the number of megaflops that can be achieved, which is the reason why supercomputers made up of computational boards have been quite replaced with supercomputers made up of computational chipsets. No wonder women are dominant! Obviously, since women's brains aren't inflated with water to the same degree as men's, their brain cells are closer together, resulting in shorter dendrons, resulting in a greater quickness and acuity of mind — something which anyway

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we can observe happening every day.)



[Dr. William Benjamin Carpenter](#) was being suspected, incorrectly, of the authorship. His son Joseph Estlin Carpenter was born (eventually this son would help out in the republication of some of his father's works).

When this [VESTIGES](#) first became available for purchase, its price of 7s. 6d. put it entirely out of the reach of the general public. This was not a pamphlet to unsettle the masses. If available at all for the general reader, it would be found in the lending library of a mechanics' institute, for a person who had purchased an annual subscription which entitled him to check out books. —But then a “peoples’ edition” would be put out in 1846 at 2s. 6d. A lawyer of Springfield, [Illinois](#), Abraham Lincoln, would read straight through the anonymous [VESTIGES OF THE NATURAL HISTORY OF CREATION](#) and would proclaim himself “a warm advocate of the doctrine.”



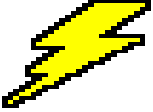
On October 22nd, believers donned their robes. A large gathering lived in or around Groton. Believing that Christ would return on a mountaintop, they climbed up Mt. Wachusett to await the coming of the Lord. One respectable but arthritic old man from Harvard who could not make it up the mountain stationed himself at the very top of the tallest apple tree in his orchard and waited out the night. In [New Bedford](#), a whole family perched on the branches of an apple tree dressed in their white robes. According to one story, a man accosted Ralph Waldo Emerson and the Reverend Theodore Parker on a Concord road and excitedly asked if they realized that the world was going to end that day. “Mr. Parker said: ‘It does not concern me, for I live in Boston.’ And Mr. Emerson said: ‘The end of the world does not affect me; I can get along without it.’”



ASTRONOMY

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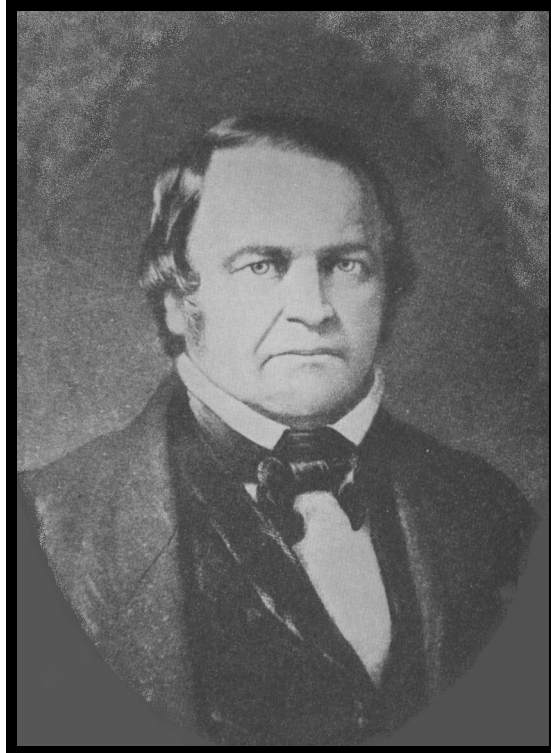
October 22: Sarah Bernhardt, “the Divine Sarah,” was born as Rosine Bernard in Paris.



The 2nd “Great Disappointment” for the Reverend [William Miller](#) of Pittsfield’s [Millerite](#) “adventists.” The Reverend Samuel S. Snow, an influential Millerite, had predicted the [Second Coming](#) on this day. The date had then been accepted by Miller himself. After the inevitable no-show, the event would become known as the “Great Disappointment” (Gould, Stephen Jay. QUESTIONING THE MILLENNIUM. NY: Harmony Books, 1997, page 49, Festinger, Leon et al. WHEN PROPHECY FAILS. Minneapolis MN: U of Minnesota P, 1956, page 17). Although they would be been kept waiting dressed in white robes all day and all night, on their rooftops and

on specially constructed roofless church platforms — this earth was refusing to cease to exist.

SEEDS: Who could believe in prophecies of Daniel or of Miller that the world would end this summer, while one milkweed with faith matured its seeds?



MILLENNIALISM

December: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

No.	Date.	Greenwich M. S. T. of Peri- helion Passage.	Longitude of Ascend- ing Node.	Longitude of Perihelion.	Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Direction.	Name of Computer.
	A. D.	N. S.	" ' "	" ' "	" ' "	" ' "			y.		
165	1844	Sept. 2.45431	63 53 20	342 34 10	278 40 50	2 55 2	1.186545	0.6186103	5.488	D	Goldschmidt.
		2.59311	63 47 18	342 56 5	279 8 47	2 54 46	1.182616	0.6019600	5.121	D	Faye.
166	1844	Oct. 17.33613	31 43 16	180 28 21	211 14 55	48 36 22	0.8552995			R	Hind.
167	1844	Dec. 13.75660	119 39 44	294 10 6	174 30 22	45 7 8	0.2351532	0.9804300	41.46	D	Hind.
		13.68294	118 27 35	296 4 43	177 37 8	45 36 34	0.2512598			D	Hind.

SKY EVENT

1845

[George Phillips Bond](#), George Frisbie Hoar, son of [Concord](#)’s Squire Samuel Hoar, and Gorham Bartlett, son of [Concord](#)’s [Dr. Josiah Bartlett](#), graduated from [Harvard College](#).

NEW “HARVARD MEN”

[Benjamin Apthorp Gould](#) went to Germany to study mathematics and [astronomy](#) under Johann Carl Friedrich Gauss at the University of Göttingen (he would make himself the 1st American to earn a doctorate in this field).



ASTRONOMY

ASTRONOMY

The following tabulation would be Horace Rice Hosmer's sarcastic take on a Franklin Benjamin Sanborn piece of eugenic engineering (and piece of typical [Concord](#) conceit), to wit, "Perpetuity, indeed, and hereditary transmission of everything that by nature and good sense can be inherited, are among the characteristics of Concord":

The Harvard Apples that do or do not fall far from the Tree

CLASS	NAME	FATHER	SON
1834	George Moore	Abel Moore, the county sheriff in Concord, "came from Sudbury a rich farmer"	"Mason by trade and rich"
1835	Hiram Barrett Dennis	"came from Boston because he was a drunkard"	"died a drunkard's death when about 30"
1835	Ebenezer Rockwood Hoar	Judge Samuel Hoar	"came from Lincoln a rich lawyer"
1837	Henry D. Thoreau	"little, deaf pencil maker"	"never free from pecuniary difficulties the greater part of his life"
1841	John Shepard Keyes	John Keyes, founder of The Republican during the 1840 election, "came from Westford"	"Lawyer" [State Senator, District Judge]
1844	George M. Brooks	"came from Lincoln"	"Lawyer" [Judge]
1844	Edward Sherman Hoar	"came from Lincoln a rich lawyer"	"brother of Ebenezer R. Hoar"
1845	Gorham Bartlett	Dr. Josiah Bartlett , the Thoreau family physician, "came from Chelmsford"	[a pupil in Concord Academy who became a] "Doctor"
1846	George Frisbie Hoar	"came from Lincoln a rich lawyer"	"brother of Ebenezer R. Hoar"
1847	George Haywood	Dr. Abiel Heywood, long term town clerk and chairman of the Concord Board of Selectmen	"was a Doctor, and wealthy, of Concord"
1849	Joseph Boyden Keyes	"brother of Thomas L. Keyes"	became a lawyer
1851	Nathan H. Barrett	Captain Nathan Barrett "was a rich farmer of Concord"	Nathan Henry Barrett became a government clerk

Léon Foucault and Armand Fizeau took the 1st clear Daguerreotype of the surface of the [sun](#) (it was while figuring out how to keep his [telescope](#) pointed unwaveringly at the sun that Foucault devised his great pendulum).

ASTRONOMY

Independently, John Couch Adams and Urbain Jean Joseph Leverier arrived by mathematical calculations at the prediction that there needed to be some 8th planet farther out in our solar system, beyond the orbit of the mysterious 7th, [Uranus](#), that had been discovered in 1781.

ASTRONOMY

Michael Faraday of England described the rotation of the plane of polarized light as it passes through glass in a magnetic field (now known as the “Faraday effect”).

HISTORY OF OPTICS

January: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

168	1845	Jan.	8.15588336	44	30	91	19	39	114	35	9	46	50	30	0.905189			D	Gotze.
169	1845	Apr.	22.99687347	51	28	194	58	52	207	7	24	54	17	40	1.233490	0.8802689	33.07	D	Clausen.
			21.03290347	10	47	192	37	26	205	26	39	56	24	6	1.254706			D	Hind.
			21.04124347	11	10	192	38	25	205	27	15	56	22	51	1.254544			D	Gotze.
			20.97094347	9	48	192	33	17	205	27	29	56	27	18	1.255323	1.0039886		D	Jeniker and Hom-
170	1845	June	5.68701337	53	0	262	4	44	75	48	16	48	55	8	0.401077			R	d'Arrest.
			5.67743337	53	7	262	7	9	75	45	58	48	41	59	0.401615	0.9898745	250	R	d'Arrest.
			5.35779341	9	52	265	7	39	76	2	13	49	37	4	0.397809			R	Kendall.
			5.5395	339	56	53	263	44	25	76	12	38	49	0	21	0.400226		R	Peirce.

SKY EVENT

April: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

168	1845	Jan.	8.15588336	44	30	91	19	39	114	35	9	46	50	30	0.905189			D	Gotze.
169	1845	Apr.	22.99687347	51	28	194	58	52	207	7	24	54	17	40	1.233490	0.8802689	33.07	D	Clausen.
			21.03290347	10	47	192	37	26	205	26	39	56	24	6	1.254706			D	Hind.
			21.04124347	11	10	192	38	25	205	27	15	56	22	51	1.254544			D	Gotze.
			20.97094347	9	48	192	33	17	205	27	29	56	27	18	1.255323	1.0039886		D	Jeniker and Hom-
170	1845	June	5.68701337	53	0	262	4	44	75	48	16	48	55	8	0.401077			R	d'Arrest.
			5.67743337	53	7	262	7	9	75	45	58	48	41	59	0.401615	0.9898745	250	R	d'Arrest.
			5.35779341	9	52	265	7	39	76	2	13	49	37	4	0.397809			R	Kendall.
			5.5395	339	56	53	263	44	25	76	12	38	49	0	21	0.400226		R	Peirce.

SKY EVENT

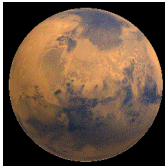
June: A comet appeared, with a mere 5° tail but with a prominent false nucleus.

According to a list published in Boston in 1846, attributed to Professor Benjamin Peirce:

168	1845	Jan.	8.15588	336	44	30	91	19	39	114	35	9	46	50	30	0.905189			D	Gotze.
169	1845	Apr.	22.99687	347	51	28	194	58	52	207	7	24	54	17	40	1.233490	0.8802689	33.07	D	Clausen.
			21.03290	347	10	47	192	37	26	205	26	39	56	24	6	1.254706			D	Hind.
			21.04124	347	11	10	192	38	25	205	27	15	56	22	51	1.254544			D	Gotze.
			20.97094	347	9	48	192	33	17	205	27	29	56	27	18	1.255323	1.0039886		D	Jeniker and Hom- [stein.
170	1845	June	5.68701	337	53	0	262	4	44	75	48	16	48	55	8	0.401077			R	d'Arrest.
			5.67743	337	53	7	262	7	9	75	45	58	48	41	59	0.401615	0.9898745	250	R	d'Arrest.
			5.35779	341	9	52	265	7	39	76	2	13	49	37	4	0.397809			R	Kendall.
			5.5395	339	56	53	263	44	25	76	12	38	49	0	21	0.400226			R	Peirce.

SKY EVENT

August 18, Monday: Ormsby MacKnight Mitchel of the Cincinnati Observatory established that an area of the rim of the south polar cap of the planet Mars was detaching itself each year, and gradually afterward disappearing.



ASTRONOMY



ASTRONOMY

ASTRONOMY

December 6, Saturday: [Henry Thoreau](#) had been sleeping at the new Thoreau boardinghouse on Texas Street since November 12th, while waiting for the plaster to dry in the shanty at the pond.

EMERSON'S SHANTY
TIMELINE OF WALDEN

At this point it had become dry enough for sleeping there to be comfortable:

[WALDEN](#): At length the winter set in in good earnest, just as I had finished plastering, and the wind began to howl around the house as if it had not had permission to do so till then. Night after night the geese came lumbering in in the dark with a clangor and a whistling of wings, even after the ground was covered with snow, some to alight in Walden, and some flying low over the woods toward Fair Haven, bound for Mexico. Several times, when returning from the village at ten or eleven o'clock at night, I heard the tread of a flock of geese, or else ducks, on the dry leaves in the woods by a pond-hole behind my dwelling, where they had come up to feed, and the faint honk or quack of their leader as they hurried off. In 1845 Walden froze entirely over for the first time on the night of the 22nd of December, Flint's and other shallower ponds and the river having been frozen ten days or more; in '46, the 16th; in '49, about the 31st; and in '50, about the 27th of December; in '52, the 5th of January; in '53, the 31st of December. The snow had already covered the ground since the 25th of November, and surrounded me suddenly with the scenery of winter. I withdrew yet farther into my shell, and endeavored to keep a bright fire both within my house and within my breast. My employment out of doors now was to collect the dead wood in the forest, bringing it in my hands or on my shoulders, or sometimes trailing a dead pine tree under each arm to my shed. An old forest fence which had seen its best days was a great haul for me. I sacrificed it to Vulcan, for it was past serving the god Terminus. How much more interesting an event is that man's supper who has just been forth in the snow to hunt, nay, you might say, steal, the fuel to cook it with! His bread and meat are sweet. There are enough fagots and waste wood of all kinds in the forests of most of our towns to support many fires, but which at present warm none, and, some think, hinder the growth of the young wood. There was also the drift-wood of the pond. In the course of the summer I had discovered a raft of pitch-pine logs with the bark on, pinned together by the Irish when the railroad was built. This I hauled up partly on shore. After soaking two years and then lying high six months it was perfectly sound, though waterlogged past drying. I amused myself one winter day with sliding this piecemeal across the pond, nearly half a mile, skating behind with one end of a log fifteen feet long on my shoulder, and the other on the ice; or I tied several logs together with a birch withe, and then, with a longer birch or alder which had a hook at the end, dragged them across. Though completely waterlogged and almost as heavy as lead, they not only burned long, but made a very hot fire; nay, I thought that they burned better for the soaking, as if the pitch, being confined by the water, burned longer as on a lamp.



Left house on account of Plastering wed. Nov. 12 at night –returned sat. Dec 6th–
 Man does not live long in this world without finding out the comfort there is in a house the domestic comforts –which originally belong to the house –more than to the family. Man was not made so large limbed and tough but that he must seek to narrow his world and wall in a space such as fitted him. He found himself all bare and out of doors (and out doors is there still, and has remained all bare and unchanged, serene and wintry by turns since Adam) and though this was pleasant enough in serene and warm weather by day light –the rainy seasons and the winters would perchance have nipped his race in the bud –if he had not first of all clothed himself with the shelter of a house of some kind. Adam and Eve according to the fable wore the bower before other clothes. Where is home –without a house?

Though the race is not so degenerated but A man might possibly live in a cave today and keep himself warm by furs Yet as caves and wild beasts are not plenty enough to accommodate all at the present day –it were certainly better to accept the advantages which the invention and industry of mankind offer.

In thickly settled civilized communities boards & shingles lime & brick are cheaper and more easily come at than suitable caves.– or the whole logs or bark in sufficient quantity –or even clay or flat stones.

A tolerable house for a rude and hardy race that lived much out of doors was once made here without any of these materials. According to the testimony of the first settlers of Boston an Indian wigwam was as comfortable in winter as an English house with all its wainscoting. And they had advanced so far, as to regulate the effect of the wind by a mat suspended over the hole in the roof, which was moved by a string. Such a lodge was in the first instance erected in a day or two and every family had one –and taken down and put up again in a few hours. Thus (to try our civilization by a fair test) in the ruder states of society every family owns a shelter as good as the best –and sufficient for its ruder and simpler wants –but in modern civilized society –though the birds of the air have their nests and woodchucks and foxes their holes –though each one is commonly the owner of his coat and hat though never so poor –yet not more than one man in a thousand owns a shelter– but the 999 pay an annual tax for this outside garment of all –indispensable summer and winter which would buy a village of Indian wigwams and contributes to keep them poor as long as they live.

But, answers one, by simply paying this annual tax the poorest man secures an abode which is a palace compared to the Indian's. An annual rent of from 20 to 60 or 70 dollars entitle him to the benefit of all the improvements of centuries. Rumford fire place –Back plastering– Venitian blinds –copper pump Spring lock –&c &c–

But while civilization has been improving our houses she has not equally improved the men who should occupy them. She has created palaces but it was not so easy to create noblemen and kings– The mason who finishes the cornice of the palace returns at night perchance to a hut no better than a wigwam.

If She claims to have made a real advance in the welfare of man –she must show how she has produced better dwellings without making them more costly– And the cost of a thing it will be remembered is the amount of life it requires to be exchanged for it. An average house costs perhaps 1500 dollars and to earn this sum will require from 15 to 20 years of the day-laborer's life even if he is not incumbered with a family –so that he must spend more than half his life before a wigwam can be earned– And if we suppose he he pays a rent instead this is but a doubtful choice of evils

Would the savage have been wise to exchange his wigwam for a palace on these terms?

When I consider my neighbors –the farmers of Concord for instance, who are least as well off as the other classes, what are they about? For the most part I find that they have been toiling 10 20 or thirty years to pay for their farms and we set down on half of that toil to the cost of their houses, and commonly they have not yet paid for them.

This is the reason they are poor and for similar reasons we are all poor in respect to a thousand savage comforts though surrounded by luxuries.

But most men do not know what a house is –and the mass are actually poor all their days because they think they must have such an one as their neighbors– As if one were to wear any sort of coat the tailor might cut out for him –or gradually leaving off palm leaf hat and cap of woodchuck skin should complain of hard times because he cannot by him a crown.– {*One-fourth page blank*}

It reflects no little dignity on Nature –the fact that the Romans once inhabited her.– That from this same unaltered hill, forsooth, the Roman once looked out upon the sea –as from a signal station.

–The vestiges of military roads –of houses and tessellated courts and baths– Nature need not be ashamed of these relics of her children.– The heroes' cairn– One doubts at length whether his relations or nature herself raised the hill. The whole earth is but a hero's cairn.

How often are the Romans flattered by the Historian and Antiquary their vessels penetrated into this frith and up that

The earth



Which seems so barren once gave birth
To heroes — who oerran her plains,
Who plowed her seas and reaped her grains

river of some remote isle —their military monuments still remain on the hills and under the sod of the valleys—
The oft repeated Roman story is written in still legible characters in every quarter of the old world, and but today
a new coin is dug up which repeats or confirms their fame. Some “Judaea Capta” —with silent argument and
demonstration puts at rest whole pages of history {*One-fourth page blank*}

Some make the Mythology of the Greeks to have been borrowed from that of the Hebrews —which however is
not to be proved by analogies —the story of Jupiter dethroning his father Saturn, for instance from the conduct
of Cham towards his father Noah, and the division of the world among the three brothers—

But the Hebrew fable will not bear to be contrasted with the (Grecian (?). The latter is infinitely more sublime
and divine. The one is a history of mortals —the other a history of gods & heroes —therefore not so ancient.
The one God of the Hebrews is not so much of a gentleman not so gracious & divine not so flexible and Catholic
does not exert so intimate an influence on nature than many a one of the Greeks. he is not less human though
more absolute and unapproachable

The Grecian were youthful and living gods —but still of godly —or divine race and had the virtues of gods—
The Hebrew, had not all of the divinity that is in man —no real love for man —an inflexible justice

The attribute of the one god —has been infinite power —not grace —not humanity —nor love —even —wholly
Masculine —with no sister Juno —no Apollo no Venus in him

I might say that the one God was not yet Apotheosized —not yet become the current material of poetry—

The Wisdom of some of those Greek fables is remarkable The God Apollo (Wisdom —Wit Poetry) condemned
to serve —keep the sheep of *King Admetus*— So is poetry allied to the State

To AEacus Minos, Radamanthus, Judges in hell, only naked men came to be judged— As Alex. Ross comment
“In this world we must not look for Justice; when we are stript of all, then shall we have it. For here something
will be found about us that shall corrupt the Judge.”

— When the island of AEgina was depopulated by sickness at the instance of AEacus Jupiter turned the ants into
men —ie. —made men of the inhabitants who lived meanly like ants.

The hidden significance of these fables which has been detected —the ethics running parallel to the poetry and
history —is not so remarkable —as the readiness with which they may be made to express any Truth They are
the skeletons of still older and more universal truths than any whose flesh and blood they are for the time made
to wear— It is like striving to make the sun & the wind and the sea signify the propositions of our day.

Piety —that carries its father on its shoulders.

Music was of 3 kinds —mournful —martial & effeminate —Lydian —Doric & Phrygian— Its inventors Amphion —
Thamiras —& Marsias— Amphion was bred by shepherds. He caused the stones to follow him & built the walls
of Thebes by his music— All orderly and harmonious or beautiful structures may be said to be raised to a slow
music.

Harmony was begotten of Mars & venus.

Antaeus was the son of Neptune & the Earth— All physical bulk & strength is of the earth & mortal when it
loses this point d’appui it is weakness; it cannot soar. And so vice versa you can intepret this fable to the credit
of the earth.

They all provoked or challenged the Gods —Amphion —Apollo & Diana and was killed by them— Thamiras the
Muses who conquered him in music, took away his eyesight & melodious voice —and broke his lyre. Marsyas
took up the flute which Minerva threw away —challenged Apollo —was flayed alive by him & his death mourned
by Fauns Satyrs & Dryads whose tears produced the river which bears his name.

The fable which is truly and naturally composed —so as to please the imagination of a child —harmonious though
strange like a wild flower —is to the wise man an apothegm and admits his wisest interpretation.

When we read that Bacchus made the Tyrrhenian mariners mad, so that they leapt into the sea mistaking it for
“a meadow full of flowers”, “and so became dolphins —we are not concerned about the historical truth of this,
but rather a higher poetical truth. We seem to hear the music of a thought and care not if our intellect be not
gratified

The mythologies —those vestiges of noble poems the world’s inheritance —still reflecting some of their original
hues —like the fragments of clouds tinted by the departed sun —the wreck of poems —a retrospect as the loftiest
fames. Some fragment will still float into the latest summer day —and ally this hour to the morning of creation.
They are materials and hints for a history of the rise and progress of the race. How from the condition of ants
we arrived at the condition of men, how the arts were invented gradually— Let a thousand surmises shed some
light on this history. We will not be confined by historical —even geological periods —which would allow us to
doubt of a progress in human events— If we rise above this wisdom for the day —we shall expect this morning
of the race —in which they have been supplied with the simplest necessities —with corn and wine and honey —
and oil —and fire —and articulate speech and agricultural and other arts —reared up by degrees from the condition
of ants will be succeeded by a day of equally progressive splendor —that in the lapse of gods summers —other
divine agents and godlike man will assist to elevate the race of men as much above its present condition

VENUS



ASTRONOMY

ASTRONOMY

Aristeus “found out honey and oil”, “He obtained of Jupiter and Neptune, that the pestilential heat of the dog days, wherein was great mortality, should be mitigated with wind.”

December 8, Monday: Discovery of a 5th [asteroid](#).

December 29, Monday: The Republic of [Texas](#) became the 28th state of the United States of America. In protest Mexico severed relations with the United States of America.

The [comet Biela](#) which had been recorded in 1772, in 1805, in 1826, in 1832, and in 1839 was already, during its pass by the sun in this year, beginning its disintegration.

SKY EVENT

1846

[George Phillips Bond](#) became an “assistant observer,” officially, as he assisted his father [William Cranch Bond](#) at [Harvard Observatory](#).

ASTRONOMY

ASTRONOMY

ASTRONOMY

[Thomas De Quincey](#)'s "System of the Heavens as Revealed by Lord Rosse's Telescope" appeared in [Tait's Magazine](#).¹⁰⁰



ASTRONOMY

100. William Parsons, 3d Earl of Rosse, had constructed a 72-inch reflecting telescope at Borra Castle in Parsonstown, County Offaly that was and would remain for the remainder of the 19th Century, the largest (above is a photo of a reconstruction of it). He had been the 1st to describe in a galaxy a spiral structure, and here is his 1845 sketch — and the galaxy known as M51:



ASTRONOMY

ASTRONOMY

The Clark family began the firm of [Alvan Clark & Sons](#) in Cambridge, Massachusetts, to develop and manufacture lenses for large refracting telescopes.

ASTRONOMY



Martin Robison Delany began to work in conjunction with Frederick Douglass of Rochester NY in the publication of The North Star. (This would continue until Delany would be admitted to Harvard Medical School in 1849.)



POLARIS

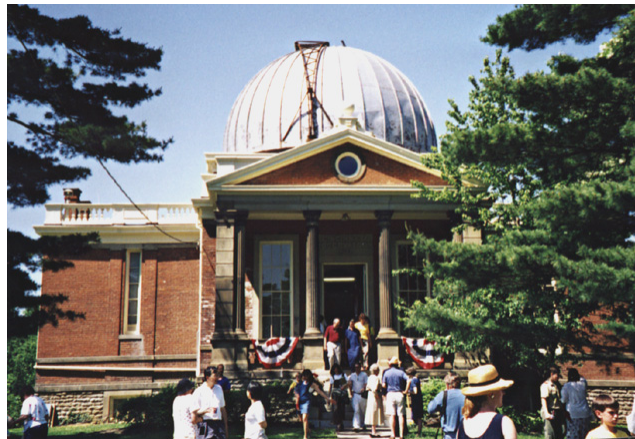
ASTRONOMY

ASTRONOMY

Urbain-Jean-Joseph Le Verrier had by computation established the position that a new planet would need to be at, in the sky, to balance the known orbits of Uranus. After one hour of pointing a [telescope](#) toward that particular location, the German astronomer Johann G. Galle discovered that the calculations had been correct within one degree. The new planet would be named “Neptune.” This is what it now looks like, through the Hubble Space Telescope:



A 6th edition of Ormsby McKnight Mitchel, A.M.’s revision to [Elijah Hinsdale Burritt](#), A.M.’s THE GEOGRAPHY OF THE HEAVENS, AND CLASS BOOK OF [ASTRONOMY](#); ACCOMPANIED BY A CELESTIAL ATLAS. BY ELIJAH H. BURRITT, A.M. FIFTH EDITION. WITH AN INTRODUCTION BY THOMAS DICK, LL.D., AUTHOR OF THE “CHRISTIAN PHILOSOPHER,” &C (New York). This is a current snapshot of Mitchel’s observatory outside Cincinnati:



Three Frenchmen were reported as having made sightings of a second moon orbiting the earth, this moon a smaller body with a considerably elliptical orbit.

ASTRONOMY

January: Biela’s Comet returned, and it was noticed that its central condensation had split in two fellow-travelers. The distance between the two nuclei was about six times the distance between the earth and its moon. When this comet would return again, in 1852, its two portions would be seen to have drifted much farther apart.

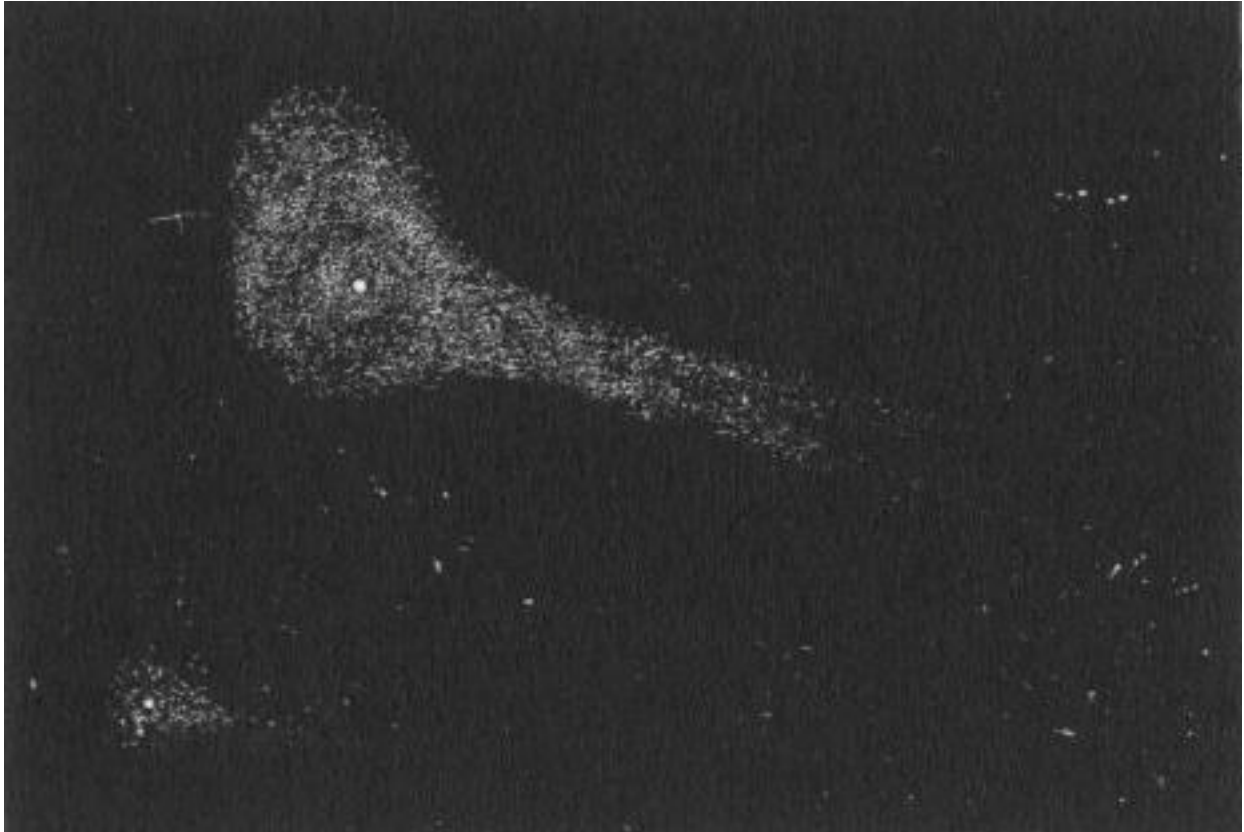
According to a list published in Boston in 1846, attributed to Professor Benjamin Peirce:

171	1846	Jan.	22.01124	111	7	50	89	1	48	337	53	58	47	31	23	1.482166				R	Peirce.
B	1846	Feb.	10.99547	246	0	18	109	9	8	223	8	49	12	34	14	0.8562966	0.7554707	6.553	D	Hind.	[rest.
B ¹			11.02331	245	47	51	109	5	31	223	17	40	12	39	45	0.8566714	0.7563402	6.592	D	Brunow and d'Ar-	
B ²			11.27164	245	50	7	108	59	38	223	9	31	12	43	15	0.8569306	0.7591178	6.710	D	Coffin.	
172	1846	Feb.	25.29903	102	54	35	116	31	23	13	36	48	30	48	37	0.6503798	0.789249	5.421	D	Coffin.	
173	1846	Mar.	5.5376	77	52	50	89	54	35	12	51	46	84	46	33	0.6673			D	Goujou.	
			5.5500	77	40	47	90	33	59	12	59	52	85	5	7	0.6635001	0.960823	70.	D	G. P. Bond.	
			5.54775	77	36	47	90	30	40	12	53	57	85	6	12	0.663735	0.9622465	73.715	D	G. P. Bond.	
174	1846	June	5.33194	261	58	27	162	25	26	99	33	1	29	18	57	0.634431			D	Peirce.	
			5.3486	261	58	0	162	26	27	99	31	37	29	19	10	0.634399			R	Peirce.	
																				Walker.	

SKY EVENT

February: The [comet](#) that had been discovered by Austrian astronomer Wilhelm, Baron von Biela (1782-1856), with an orbital period of 6 years and 9 months, appeared again, and this time it was noticed to have split into two halves, each with its own tail. According to a list published in Boston in 1846, attributed to Professor [Benjamin](#)

SKY EVENT



ASTRONOMY

ASTRONOMY

Peirce

No.	Date.	Greenwich M. S. T. of Peri- helion Passage.	Longitude of Ascend- ing Node.	Longitude of Perihelion.	Angle betw. Perihelion and Node.	Inclination.	Perihelion Distance.	Eccentric- ity.	Period of Revolution.	Direction.	Name of Computer.
	A. D.	N. S.	" "	" "	" "	" "			y.		
165	1844	Sept. 2.45431	63 53 20	342 34 10	278 40 50	2 55 2	1.186545	0.6186103	5.488	D	Goldschmidt.
		2.59311	63 47 18	342 56 5	279 8 47	2 54 46	1.182616	0.6019600	5.121	D	Faye.
166	1844	Oct. 17.33613	31 43 16	180 28 21	211 14 55	48 36 22	0.8552995			R	Hind.
167	1844	Dec. 13.75660	119 39 44	294 10 6	174 30 22	45 7 8	0.2351532	0.9804300	41.46	D	Hind.
		13.68294	118 27 35	296 4 43	177 37 8	45 36 34	0.2512598			D	Hind.
168	1845	Jan. 8.15588	336 44 30	91 19 39	114 35 9	46 50 30	0.905189			D	Gotze.
169	1845	Apr. 22.99687	347 51 28	194 58 52	207 7 24	54 17 40	1.233490	0.8802689	33.07	D	Clausen.
		21.03290	347 10 47	192 37 26	205 26 39	56 24 61	1.254706			D	Hind.
		21.04124	347 11 10	192 38 25	205 27 15	56 22 51	1.254544			D	Gotze.
		20.97094	347 9 48	192 33 17	205 27 29	56 27 18	1.255323	1.0039886		D	Jeniker and Hom-stein.
170	1845	June 5.68701	337 53 0	262 4 44	75 48 16	48 55 8	0.401077			R	d'Arrest.
		5.67743	337 53 7	262 7 9	75 45 58	48 41 59	0.401615	0.9898745	250	R	d'Arrest.
		5.35779	341 9 52	265 7 39	76 2 13	49 37 4	0.397809			R	Kendall.
		5.5395	339 56 53	263 44 25	76 12 38	49 0 21	0.400226			R	Peirce.
171	1846	Jan. 22.01124	111 7 50	89 1 48	337 53 58	47 31 23	1.482166			D	Hind.
B	1846	Feb. 10.99547	246 0 18	109 9 8	223 8 49	12 34 14	0.8562966	0.7554707	6.553	D	Brunow and d'Ar-rest.
B ¹		11.02331	245 47 51	109 5 31	223 17 40	12 39 45	0.8566714	0.7563402	6.592	D	Coffin.
B ²		11.27164	245 50 7	108 59 38	223 9 31	12 43 15	0.8569306	0.7591178	6.710	D	Coffin.
172	1846	Feb. 25.29903	102 54 35	116 31 23	13 36 48	30 48 37	0.6503798	0.789249	5.421	D	Goujou.
173	1846	Mar. 5.5376	77 52 50	89 54 35	12 51 46	84 46 33	0.6673			D	G. P. Bond.
		5.5500	77 40 47	90 33 59	12 59 52	85 5 7	0.6635001	0.960823	70.	D	G. P. Bond.
		5.54775	77 36 47	90 30 40	12 53 57	85 6 12	0.663735	0.9622465	73.715	D	Peirce.
174	1846	June 5.33194	261 58 27	162 25 26	99 33 1	29 18 57	0.634431			R	Peirce.
		5.3486	261 58 0	162 26 27	99 31 37	29 19 10	0.634399				Walker.

April: Edward Claudius Herrick reported in the American Journal of Science that: "It appears quite probable that the train of this comet was seen in the evening before the perihelion passage, at Bermuda, Philadelphia, and Porto Rico, on the 19th, 23d and 26th of February."



SKY EVENT

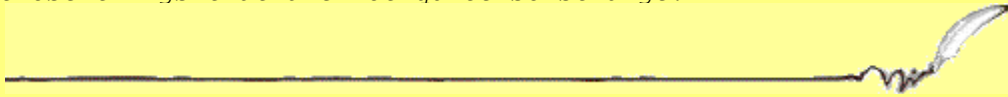
ASTRONOMY

ASTRONOMY

April: During this month or the next one, [Waldo Emerson](#) would jot down something about the activities of [Henry Thoreau](#) in his JOURNAL:

ASTRONOMY

Queenie came it over Henry last night when he taxes the new astronomers with the poverty of their discoveries & showings – not strange enough. Queenie wished to see with eyes some of those strange things which the telescope reveals, the satellites of Saturn, &c. H. said that stranger things might be seen with the naked eye. "Yes," said Queenie "but I wish to see some of those things that are not quite so strange."



HARVARD OBSERVATORY

Here is the beginning of this April, and the Purple Martin *Progne subis*, in the [WALDEN](#) manuscript:

[WALDEN](#): For a week I heard the circling groping clangor of some solitary goose in the foggy mornings, seeing its companion, and still peopling the woods with the sound of a larger life than they could sustain. In April the pigeons were seen again flying express in small flocks, and in due time I heard the martins twittering over my clearing, though it had not seemed that the township contained so many that it could afford me any, and I fancied that they were peculiarly of the ancient race that dwelt in hollow trees ere white men came. In almost all climes the tortoise and the frog are among the precursors and heralds of this season, and birds fly with song and glancing plumage, and plants spring and bloom, and winds blow, to correct this slight oscillation of the poles and preserve the equilibrium of Nature.



ASTRONOMY

April 30, Thursday: The diary of [William Cranch Bond](#) of [Harvard Observatory](#) reports

a happy day for Cambridge ... a day of as pure and unallowed enjoyment as perhaps the world ever gave its votaries.

ASTRONOMY

The occasion was the inauguration dinner and fireworks in honor of a new president for [Harvard College](#), [Edward Everett](#).¹⁰¹ It had been the chemistry professor of [Harvard Medical College](#), the convivial Doctor [John White Webster](#), who had insisted that they must have fireworks.



101. President-elect [Everett](#) might have felt like Nanky-Poo in the opera "Madame Butterfly." His three years in this office would later be characterized as the "most wretched" of his life.



ASTRONOMY

ASTRONOMY

May 5, Tuesday: Henryk Sienkiewicz, author (QUO VADIS, Nobel 1905), was born in Poland.



May 5th: Now I hear the whippoorwill every night –they are my clock –now two are singing one a stanza behind the other. Like Scotland’s burning, now together in exact time now one lags.

The subject of sex is a most remarkable one –since though it occupies the thoughts of all so much, and our lives & characters are so affected by the consequences which spring from this source– Yet mankind as it were tacitly agrees to be silent about it –at least the sexes do one to another. Here is the most interesting of all human facts or relations still veiled, more completely than the Eleusinian mystery– Out of such secrecy & awe one would think that some religion would spring. I am not sorry for the silence– It is a golden reserve which speech has not yet desecrated– I believe it is unusual for the most intimate friends to impart the pleasures –or the anxieties connected with this fact– This is wonderfully singular –& when from this soil our flowers grow and music has its root here.

I love men with the same distinction that I love woman –as if my friend were of some third sex –some other or stranger and still my friend.

I do not think the shakers exaggerate this fact –but all mankind exaggerate it much more by silence. In the true and noblest relations of the sexes there is somewhat akin to the secret of all beauty & art in the universe The imagination of the Greeks filled the heavens full of love & benignity in a thousand forms –flitting from this side to that– From Apollo in the sun to Aurora in the morning –still charming the world with this inexplicable variety– What sort of Dualism or difference there is who ever conceived? If there are Gods there are Goddesses Apollo & Venus –Neptune & Ceres– And the Hebrew’s God is Love too.

What the difference is between man and woman –that they should be so attracted to one another I never saw adequately stated.

Man and man are more nearly of the same sex.

What an infinite and divine demand is made on us forever to sustain this relation worthily

–It is easy to see that the education of mankind has not commenced –there is so little interaction– The life of the Greek would be forgotten in noble relations of the sexes to one another –and to themselves–

What can the university do to develop the inert faculties of men –if they go not hence to the more catholic university of friendship

–The end of love is not house keeping –but it consists as much or more with the letting go of the house.

Men can help one another indeed but not by money or by kindness & just & upright & neighborly behavior much –but by being gods to one another –objects of adoration– The wisest philosopher that ever lived is not such an instructor as the illiterate love of any human-being –– The world is full of suspicion when it might be full of love– There is contempt where there might as well be respect & adoration. Instead of imprisoning or executing the criminal we might so easily apotheosize him or translate him by love and admiration for what is god-like in him– And it is not done.

If men would steadily observe realities only and not allow themselves to be deluded –life would be like a fairy tale & the Arabian nights entertainments. When I am calm & wise and unhurried I perceive that only great and worthy things have any permanent & absolute existence– That petty fears and petty pleasures – are but the shadows of the reality. By closing the eyes and slumbering and consenting to be deceived by shows –men establish their daily life of routine and habit everywhere –which however is built on imaginary foundations

If men could discriminate always and were never deluded by appearances life would never be mean – nor unworthy.

Children who play life discern its true law & relations more clearly than men who fail to live it worthily – but think they are wise by experience.

Carlyle was 50 years old on the 4th Dec. 1845. —

Caught pouts from the boat –in 20 ft water off Cove May 2nd –

People had caught them from the shore four or five nights previous. —

Early in May or by the last of April the oaks hickory –maples & other trees –just putting out amidst the pine woods –give them the appearance in cloudy days especially of the sun just breaking through mists and shining on them– Their green bursting buds or expanding leaves scatter a slight sun-shine over the hillsides– It is moist bright & spring-like

The first week in May I hear the Whippoorwill –the brown-thrasher –the veery –the wood pewee –the chewink The wood thrush long before

The 3d or 4th of May I saw a loon? in the pond

AURORA

VENUS

THOMAS CARLYLE

May 15, Friday: This is the inscription Mr. William Simms of London and Mr. Joseph Cranch of London had engraved by a diamond, at the factory of Merz and Mahler in München, Germany, on the rim of the 15-inch objective lens for the Great Refractor of [Harvard Observatory](#), a piece of glass which was at that time the largest and most precise in the world:¹⁰²

Harvard College W.S. J. Cranch Munich May 15, 1846



May 15th: [Capt. Fremont](#) describes the prairies as covered with sun-flowers –and traversed occasionally by a clear & shallow creek

At the approach of evening I hear the note of the tree toad –and the veery & wood thrush –and sometimes late in the night some small bird in the forest the pine warbler? or the tree sparrow? sings aloud a distinct and pleasant strain as if awakened by its dreams. What should impel it to such an expression of its happiness I think that an important difference between men of genius or poets and men not of Genius –is in the inability of the later to grasp and confront the thought that visits them. It is too faint for expression or even conscious impression– What merely quickens or retards the blood in their veins –and fills their afternoons with pleasure they know not whence –conveys a distinct assurance to the finer organization of the poet
How to make my life of finer quality –to transplant it into futurity that is a question
Chapman seems to have come to his task the translation of Homer with the right spirit –to supply a want to England–

“O! ‘tis wondrous much
(Though nothing prized) that the right virtuous touch
Of a well-written soul, to virtue moves,
Nor have we souls to purpose, if their loves
Of fitting objects be not so inflam’d:
How much then were this kingdom’s main soul maimed
To want this great inflamer of all powers
That move in human souls? – –
being so far from cause
Of prince’s light thoughts, that their gravest laws
May find stuff to be fashioned by his lines;
Through all the pomp of kingdoms still he shines
And graceth all his gracers.”
He says of those who had translated him into other languages
They fail’d to search his deep & treasured heart,
The cause was, since they wanted the fit key
Of Nature, in their downright strength of Art;
With poesy to open poesy.

When my friends reprove me for not devoting myself to some trade or profession, and acquiring property I feel not the reproach– I am guiltless & safe comparatively on that score– But when they remind me of the advantages of society of worthy and earnest helpful relations to people I am convicted –and yet not I only but they also.

But I am advised by thee Friend of friends to strive singly for the highest –without concern for the lower – The integrity of life is otherwise sacrificed to factitious virtues –and frittered away in morbid efforts & despair.
Disturb not the sailor with too much details –but let him be sure that he keep his guiding star in his eye. It is by a mathematical point that we are wise –but there is a sufficient guidance for all our lives– The blind are led by the slightest clue.

When I am reproved for being what I am I find the only resource is being still more entirely what I am.

Carry yourself as you should and your garments will trail as they should.

I am useless for keeping flocks & herds, for I am on the trail of a rarer game.

To the mariner the faint star is the chief light though he will avail himself of the light in the binnacle.

In may the pollen of the pine (pitch) began to cover the pond with its yellow dust.

102. It would appear, since the color of William Simms is not given in the historical record and since the default presumption in our historical records is for whiteness, that this William Simms of London would have been unrelated to the Thomas Simms (Sims) of the Cornhill Coffee House. (Except, of course, for the possibility, always to be taken account of in those days, that this man might have been related to a Simms family down in the American southlands that held title to Thomas.)

June: According to a [comet](#) list published in Boston in 1846, attributed to Professor [Benjamin Peirce](#):

174	1846	June	5.33194	261	58	27	162	25	26	99	33	1	29	18	57	0.634431			73.715	D	Peirce.
			5.3486	261	58	0	162	26	27	99	31	37	29	19	10	0.634399				R	Peirce.
																					Walker.

SKY EVENT

August: Lord Ross, in Ireland, examined the moon by means of a powerful new [telescope](#) and informed us all that he could detect no vestiges of the sorts of architectural remnants which would indicate that our companion had ever been colonized by intelligent life. He detected no greens of vegetation or blues of water: “all seemed desolate,” reported [Scientific American](#).¹⁰³

ASTRONOMY

A minor machine politician in New-York, Jonathan Drake Stevenson, had gone to Washington DC and gotten himself appointed a Colonel to raise a detachment of troops and carry Americanism around the Horn to California. The men of Stevenson’s regiment, “Stevenson’s California B’hoys” recruited from the immigrant crowds on the New-York streets, would reach California in time to desert and join the 1849 gold rush, and



would then become California’s legislators, mayors, sheriffs, judges, county clerks, customs officers, tax collectors, and millionaires. A large number of the street of San Francisco would be named after them. At this point a few companies had been formed, and were assembling on Governors Island in the harbor, being issued their muskets and their bayonets, for their journey around the Horn. Most of them were getting diarrhea. Over the next two months, on this island, desertion and recruitment would approach the 100% level, despite the fact that the men were surrounded by a perimeter of armed guards with ammunition and a password.

September: At the [Harvard Observatory](#), double rings were described surrounding Saturn.¹⁰⁴

103. While this Lord had been looking up into the heavens the die-off of his Irish population was accelerating; had he directed his powerful new telescope toward one of his local potato fields all would have seemed desolate there as well — had he been utilizing instead a powerful new microscope he would have been able to watch the *Phytophthora infestans* potato blight microorganism as it multiplied itself endlessly.

104. In a certain sense, they were getting ahead of themselves. For, during this period, much of the attention of astronomers everywhere was being soaked up in an effort to ascertain the exact center of the universe. —It stands to reason that a universe has to have a center, right?

ASTRONOMY



ASTRONOMY

ASTRONOMY

September 23: Based upon perceived perturbations in the orbit of the 7th planet, Uranus, Urbain-Jean-Joseph Le Verrier (1811-1877) of the Paris Observatory, and one other astronomer, a Brit, were predicting the point in the heavens at which another, 8th, planet would seem to be just waiting to be first observed. That predicted planetary small blue disk was indeed first observed, by Johann Gottfried Galle (1812-1910) of the Breslau Observatory near Berlin, on this night, at less than one degree of arc from its predicted position: “That star is not on the map!” announced assisting student Heinrich Louis d’Arrest. The new planet would be temporarily assigned the name “Le Verrier” and eventually assigned the Roman version of the name of the Greek god of the sea Poseidon, to wit, Neptune. The English, because they are English, would arbitrarily assign credit for the discovery to the Brit who also was doing these calculations, John Couch Adams. A few weeks later, on October 10th, William Lassell (1799-1880) would discover that this new planet, just like our own, had a moon circling about it, a moon which eventually would receive the name Triton:

ASTRONOMY

WALDEN: If I wished a boy to know something about the arts and sciences, for instance, I would not pursue the common course, which is merely to send him into the neighborhood of some professor, where any thing is professed and practised but the art of life; -to survey the world through a telescope or a microscope, and never with his natural eye; to study chemistry, and not learn how his bread is made, or mechanics, and not learn how it is earned; to discover new satellites to Neptune, and not detect the motes in his eyes, or to what vagabond he is a satellite himself; or to be devoured by the monsters that swarm all around him, while contemplating the monsters in a drop of vinegar. Which would have advanced the most at the end of a month, -the boy who had made his own jack-knife from the ore which he had dug and smelted, reading as much as would be necessary for this, -or the boy who had attended the lectures on metallurgy at the Institute in the mean while, and had received a Rodgers’ penknife from his father? Which would be most likely to cut his fingers? -To my astonishment I was informed on leaving college that I had studied navigation! -why, if I had taken one turn down the harbor I should have known more about it.

ASTRONOMY



ASTRONOMY

ASTRONOMY

October 10, Saturday: The planet Neptune having been first observed by telescope a few weeks earlier, on this night William Lassell (1799-1880) was able to ascertain that this new planet, just like our own, had a moon circling about it, Triton:

ASTRONOMY

WALDEN: If I wished a boy to know something about the arts and sciences, for instance, I would not pursue the common course, which is merely to send him into the neighborhood of some professor, where any thing is professed and practised but the art of life; -to survey the world through a telescope or a microscope, and never with his natural eye; to study chemistry, and not learn how his bread is made, or mechanics, and not learn how it is earned; to discover new satellites to Neptune, and not detect the motes in his eyes, or to what vagabond he is a satellite himself; or to be devoured by the monsters that swarm all around him, while contemplating the monsters in a drop of vinegar. Which would have advanced the most at the end of a month, -the boy who had made his own jack-knife from the ore which he had dug and smelted, reading as much as would be necessary for this, -or the boy who had attended the lectures on metallurgy at the Institute in the mean while, and had received a Rodgers' penknife from his father? Which would be most likely to cut his fingers? -To my astonishment I was informed on leaving college that I had studied navigation! -why, if I had taken one turn down the harbor I should have known more about it.

ASTRONOMY

November 28: The *Margaret Evans* arrived in New York harbor with a heavy package that looked for all the world like a 5-foot bale of old cotton rags destined for a paper mill. Inside this bale were two tow bags of straw, cushioning a bundle of straw with a 3-foot square deal box inside, and inside this deal box was yet another box — and inside this one, reclining on a lining of jet-black velvet, was the largest and most precise astronomical lens in the world, destined for the new [Harvard Observatory](#) being constructed on Concord Road in Cambridge MA. The old observatory in the cupola of the Dana house was being relocated to the 11 acres of the Craigie estate on the Concord Road, then known as “Summer-House Hill.” This location was appropriate because of “its unobstructed prospect, and its freedom from all liability of having its range of vision obstructed in the future.”¹⁰⁵ A massive stone tower was being constructed, sufficient to dampen any conceivable vibration.

ASTRONOMY

105. When we pass that way today, this is harder to imagine.

December 2, Wednesday: A deed of sale was witnessed by [Henry Thoreau](#), for purchase for \$1,239.56 of 41 acres at Walden Pond by [Waldo Emerson](#).



TIMELINE OF WALDEN

By this point in time Thoreau had finished his draft account of his visit to Maine, the one into which his readings in [Herman Melville](#)'s *TYPEE* had been interpolated. Eventually this reading would show up in the

ASTRONOMY

ASTRONOMY

published [WALDEN](#), in masked form as follows:

[WALDEN](#): The manufacturers have learned that this taste is merely whimsical. Of two patterns which differ only by a few threads more or less of a particular color, the one will be sold readily, the other lie on the shelf, though it frequently happens that after the lapse of a season the latter becomes the most fashionable. Comparatively, tattooing is not the hideous custom which it is called. It is not barbarous merely because the printing is skin-deep and unalterable.



Dec 2nd 23 geese in the pond this morn. flew over my house about 10 'oclock in morn within gun shot. The ground has been covered with snow since Nov. 25th {Three-fourths page missing} {leaf missing} add lest one ray more than usual come into our eyes—a little information from the western heavens—and where



ASTRONOMY

ASTRONOMY

VENUS

are we?— ubique gentium sumus!— where are we as it is?

Who shall say what is? He can only say how he sees.

One man sees 100 stars in the heavens —another sees 1000— There is no doubt of it —but why should they turn their backs on one another, & join different sects— As for the reality no man sees it —but some see more and some less— what ground then is there to quarrel on? No man lives in that world which I inhabit —or ever came rambling into it— Nor did I ever journey in any other man's— Our differences have frequently such foundation as if [venus](#) should roll quite near to the orbit of the earth one day —and two inhabitants of the respective planets should take the opportunity to lecture one another

I have noticed that if a man thinks he needs 1000 dollars & cant be convinced that he does not —he will be found to have it. If he lives & thinks a thousand dollars will be forthcoming —though it be to by shoe-strings —they have got to come. 1000 mills will be just as hard to come to one who finds it equally hard to convince himself that he needs them. — —

Of Emerson's Essays I should say that they were not poetry —that they were not written exactly at the right crisis though inconceivably near to it. Poetry is simply a miracle & we only recognize it receding from us not coming toward us— It yields only tints & hues of thought like the clouds which reflect the sun —& not distinct propositions—

In poetry the sentence is as one word —whose syllables are words— They do not convey thoughts but some of the health which he had inspired— It does not deal in thoughts —they are indifferent to it—

A poem is one undivided unimpeded expression —fallen ripe into literature The poet has opened his heart and still lives— And it is undividedly and unimpededly received by those for whom it was matured —but mortal eye can never dissect it— while it sees it is blinded.

The wisest *man* —though he should get all the academies in the world to help him cannot add to or subtract one syllable from the line of poetry.

If you can speak what you {*Three leaves missing*} and crownings. As the youth studies minutely the order and the degrees in the imperial procession and suffered none of its effect to be lost on him —so the man at last secured a rank in society which satisfied his notion of fitness & respectability

He was defrauded of so much which the savage boy enjoys.

Indeed he himself has occasion to say in this very autobiography, when at last he escapes into the woods without the gates —“Thus much is certain, that only the undefinable, wide-expanding feelings of youth and of uncultivated nations are adapted to the sublime, which, whenever it may be excited in us through external objects, since it is either formless, or else moulded into forms which are incomprehensible, must surround us with a grandeur which we find above our reach.”

He was even too well-bred to be thoroughly bred. He says that he had had no intercourse with the lowest class of his townsmen— The child should have the full advantage of ignorance as well as of knowledge —& is fortunate if he gets his share of neglect and exposure.

“The law of nature break the rules of art”

He further says of himself “I had lived among painters from my childhood, and had accustomed myself to look at objects, as they did, with reference to art.” This was his peculiarity in after years. His writings are not the inspiration of nature into his soul —but his own observations rather.”



After December 2: When I am stimulated by reading the biographies of literary men to adopt some method of educating myself and directing my studies—I can only resolve to keep unimpaired the freedom & wakefulness of my genius. I will not seek to accomplish much in breadth and bulk and loose my self in industry but keep my celestial relations fresh.

No method or discipline can supersede the necessity of being forever on the alert— What is a course of History —no matter how well selected —or the most admirable routine of life —and fairest relation to society —when one is reminded that he may be a *Seer* that to keep his eye constantly on the true and real is a discipline that will absorb every other.

How can he appear or be seen to be well employed to the mass of men whose profession it is to climb resolutely the heights of life —and never lose a step he has taken

Let the youth seize upon the finest and most memorable experience in his life —that which most reconciled him to his unknown destiny —and seek to discover in it his future path. Let him be sure that that way is his only true and worthy career.

Every mortal sent into this world has a star in the heavens appointed to guide him— Its ray he cannot mistake—

It has sent its beam to him either through clouds and mists faintly or through a serene heaven— He knows better than to seek advice of any.

This world is no place for the exercise of what is called common sense. This world would be denied.

Of how much improvement a man is susceptible —and what are the methods?

When I meet the engine with its train of cars moving off with planetary motion or say rather like a comet —for



the beholder knows not if with that velocity and that direction it will ever revisit this system –its steam-cloud like a banner streaming behind like such a fleecy cloud as I have seen in a summer's day –high in the heavens unfolding its wreathed masses to the light –as if this travelling and aspiring man would ere long take the sunset sky for his train in livery when he travelled – When I have heard the iron horse make the hills echo with his snort like thunder, shaking the earth –with his feet and breathing fire and smoke– It seems to me that the earth has got a race now that deserves to inhabit it. If all were as it seems, and men made the elements their servants for noble ends. If the cloud that hangs over the engine were the perspiration of heroes or as innocent and beneficent an omen as that which hovers over the parched fields of the farmer.

If the elements did not have to lament their time wasted in accompanying men on their errands.

If this enterprise were as noble as it seems. The stabler was up early this winter morning by the light of the stars to fodder and harness his steed –fire was awakened too to get him off– If the enterprise were as innocent as it is early– For all the day he flies over the country stopping only that his master may rest– If the enterprise were as disinterested as it is unwearied.– And I am awakened by its tramp and defiant snort at midnight while in some far glen it fronts the elements encased in ice and snow and will only reach its stall to start once more

If the enterprise were as important as it is protracted.

No doubt there is to follow a moral advantage proportionate to this physical one

Astronomy is that department of physics which answers to Prophecy the Seer's or Poets calling It is a mild a patient deliberate and contemplative science. To see more with the physical eye than man has yet seen to see farther, and off the planet –into the system. Shall a man stay on this globe without learning something –without adding to his knowledge –merely sustaining his body and with morbid anxiety saving his soul. This world is not a place for him who does not discover its laws.

Dull Despairing and brutish generations have left the race where they found it or in deeper obscurity and night –impatient and restless ones have wasted their lives in seeking after the philosopher's stone and the elixir of life– These are indeed within the reach of science –but only of a universal and wise science to which an enlightened generation may one day attain. The wise will bring to the task patience humility (serenity) –joy –resolute labor and undying faith.I had come over the hills on foot and alone in serene summer days travelling early in the morning and resting at noon in the shade by the side of some stream and resuming my journey in the cool of the evening– With a knapsack on my back which held a few books and a change of clothing, and a stout staff in my hand. I had looked down from Hoosack mountain where the road crosses it upon the village of North Adams in the valley 3 miles away under my feet –showing how uneven the earth sometimes is and making us wonder that it should ever be level and convenient for man, or any other creatures than birds.

As the mountain which now rose before me in the Southwest so blue and cloudy was my goal I did not stop long in this village but buying a little rice and sugar which I put into my knapsack and a pint tin dipper I began to ascend the mt whose summit was 7 or 8 miles distant by the path. My rout lay up a long and spacious valley sloping up to the very clouds, between the principle ridge and a lower elevation called the Bellows. There were a few farms scattered along at different elevations each commanding a noble prospect of the mountains to the north, and a stream ran down the middle of the valley, on which near the head there was a mill It seemed a very fit rout for the pilgrim to enter upon who is climbing to the gates of heaven– now I crossed a hay field, and now over the brook upon a slight bridge still gradually ascending all the while with a sort of awe and filled with indefinable expectations as to what kind of inhabitants and what kind of nature I should come to at last– And now it seemed some advantage that the earth was uneven, for you could not imagine a more noble position for a farm and farm house than this vale afforded farther or nearer from its head, from all the seclusion of the deepest glen overlooking the country from a great elevation –between these two mountain walls. It reminded me of the homesteads on Staten Island, on the coast of New Jersey– This island which is about 18 miles in length, and rises gradually to the height of 3 or 400 feet in the centre, commands fine views in every direction, whether on the side of the continent or the ocean –and southward it looks over the outer bay of New York to Sandy Hook and the Highlands of Neversink, and over long island quite to the open sea toward the shore of Europe.

HUGUENOTS

There are sloping valleys penetrating the island in various directions gradually narrowing and rising to the central table land and at the head of these the Hugenots the first settlers placed their houses quite in the land in healthy and sheltered places from which they looked out serenely through a widening vista over a distant salt prairie and then over miles of the Atlantic –to some faint vessel in the horizon almost a days sail on her voyage to Europe whence they had come. From these quiet nooks they looked out with equal security on calm and storm on fleets which were spell bound and loitering on the coast for want of wind and on tempest & shipwreck. I have been walking in the interior seven or eight miles from the shore, in the midst of rural scenery where there was as little to remind me of the ocean as amid these N H hills when suddenly through a gap in the hills –a cleft or "Clove road", as the Dutch settlers called it I caught sight of a ship under full sail over a corn field 20 or thirty miles at sea. The effect was similar to seeing the objects in a magic lantern, passed back and forth by day-light since I had no means of measuring distance.



1847

James Hartley produced sheets of [rolled glass with an obscured ribbed finish](#) which would often find use as an architectural material for the roofs of railroad terminals.

There was a strong [Andromedid meteor shower](#) during this year, as there had been in 1798 and in 1838 — this is a shower which we connect with the now-disintegrated periodic Biela's [comet](#).¹⁰⁶

SKY EVENT

106. "COMET HIND, (C/1847 C1=1847 I). Span of naked eye visibility was from late Feb. until late Mar., T=1847 March 30. Comet distinctive for its telescopic daytime visibility rather than its display in a dark sky. Reportedly first detected with the unaided eye on February 19. At that time visible all night as a circumpolar object in Cepheus. Moved steadily toward the southeast, crossing Cassiopeia during first week of March. At mid month, when situated in the evening sky in Andromeda, 3rd or 4th magnitude with a tail over 3 degrees long. Last pre-perihelion observation made on March 24th in bright evening twilight at magnitude +1 or +2. On March 30 the comet was visible telescopically at noon, magnitude perhaps as bright as -4. Following perihelion the comet remained in conjunction with the Sun until it had faded below naked eye visibility."



ASTRONOMY

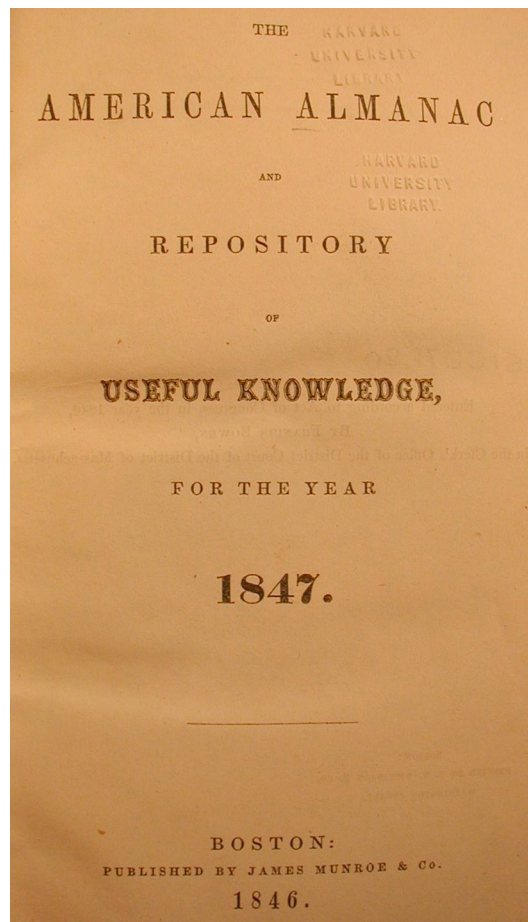
ASTRONOMY

THE [PROVIDENCE ALMANAC](#) FOR 1847.

THE RHODE-ISLAND [ALMANAC](#) FOR 1847. By Isaac Bickerstaff. [Providence, Rhode Island](#): Hugh H. Brown.

The Boston [almanac](#) for this year contained a [comet](#) list attributed to Professor [Benjamin Peirce](#) of [Harvard College](#). This list contained no predictions of future returns, listing only previous visits and orbital calculations.

ASTRONOMY



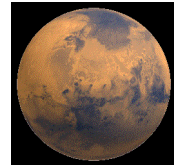
(Professor Peirce's list ends with a comet seen during 1846 and thus does not include the comet discovered by [Maria Mitchell](#) on October 1st, 1847.)

[Henry Thoreau](#) and [Waldo Emerson](#) looked at the night sky through the expensive 85-power [telescope](#) of the surveyor Perez Blood of Concord and saw "sunlight on the spurs of mountains in the dark portion" of the moon.¹⁰⁷

ASTRONOMY

May: In Scientific American there appeared an interesting summary of what was being discovered about the planets:

It is ascertained that the planets, like our own, roll in regular periods around the sun, have nights and days, are provided with atmosphere, supporting clouds, and agitated by winds. Notwithstanding the dense atmosphere and thick clouds by which Venus and Mercury are constantly enveloped, the telescope has exhibited to us great irregularities on their surfaces, and thus proved the existence of mountains and valleys. On Mars, the geographical outlines of land and water have been made apparent, and in its long polar winters snows accumulate in the desolation of the higher latitudes.


ASTRONOMY


"Mars is essentially in the same orbit ... somewhat the same distance from the Sun, which is very important. We have seen pictures where there are canals, we believe, and water. If there is water, that means there is oxygen. If oxygen, that means we can breathe."

— J. Danforth Quayle



The magazine also carried a notice about a recent development in transportation, the tube, which was not, as yet, protected by being an inner tube inside a hollow tire:

A number of cabs with newly invented wheels have just been put on the road in London. Their novelty consists in the entire absence of springs. A hollow tube of India rubber about a foot in diameter, inflated with air, encircles each wheel in the manner of a tire, and with this simple but novel appendage the vehicle glides noiselessly along, affording the greatest possible amount of cab comfort to the passenger.

107. When Thoreau would describe in his journal a visit to Blood's on the evening of July 7, 1851, he would mention that actually this was the 2d such visit:



July 7, Monday: I have been tonight with Anthony Wright to look through Perez Bloods Telescope a 2nd time. A dozen of **his** Bloods neighbors were swept along in the stream of our curiosity. One who lived half a mile this side said that Blood had been down that way within a day or two with his terrestrial or day glass looking into the eastern horizon the hills of Billerica Burlington—and Woburn— I was amused to see what sort of respect this man with a telescope had obtained from his neighbors—something akin to that which savages award to civilized men—though in this case the interval between the parties was very slight. Mr Blood with his scull cap on his short figure—his north European figure made me think of Tycho Brahe— He did not invite us into his house this cool evening—men nor women— Nor did he ever before to my knowledge I am still contented to see the stars with my naked eye Mr Wright asked him what his instrument cost He answered—"Well, that is something I dont like to tell. (stuttering or hesitating in his speech a little, as usual) It is a very proper question however"— "Yes," said I, "and you think that you have given a very proper answer."

ASTRONOMY

ASTRONOMY

Summer: Martin Robison Delany and Frederick Douglass first met. Delany would begin to work in conjunction with Douglass in Rochester, New York in the publication of the North Star.



This would continue for approximately 18 months, until Delany would win admittance to Harvard Medical School.



July 1: Discovery of a 6th [asteroid](#).

ASTRONOMY

ASTRONOMY

ASTRONOMY

August 1, Friday: [Herman Melville](#) got married with Elizabeth Shaw, daughter of [Lemuel Shaw](#), the Chief Justice of Massachusetts. That night, coincidentally of course, there would be a brilliant display of [northern lights](#) over the city of [Boston](#).¹⁰⁸

SKY EVENT



AURORA BOREALIS

August 13: Discovery of a 7th [asteroid](#).

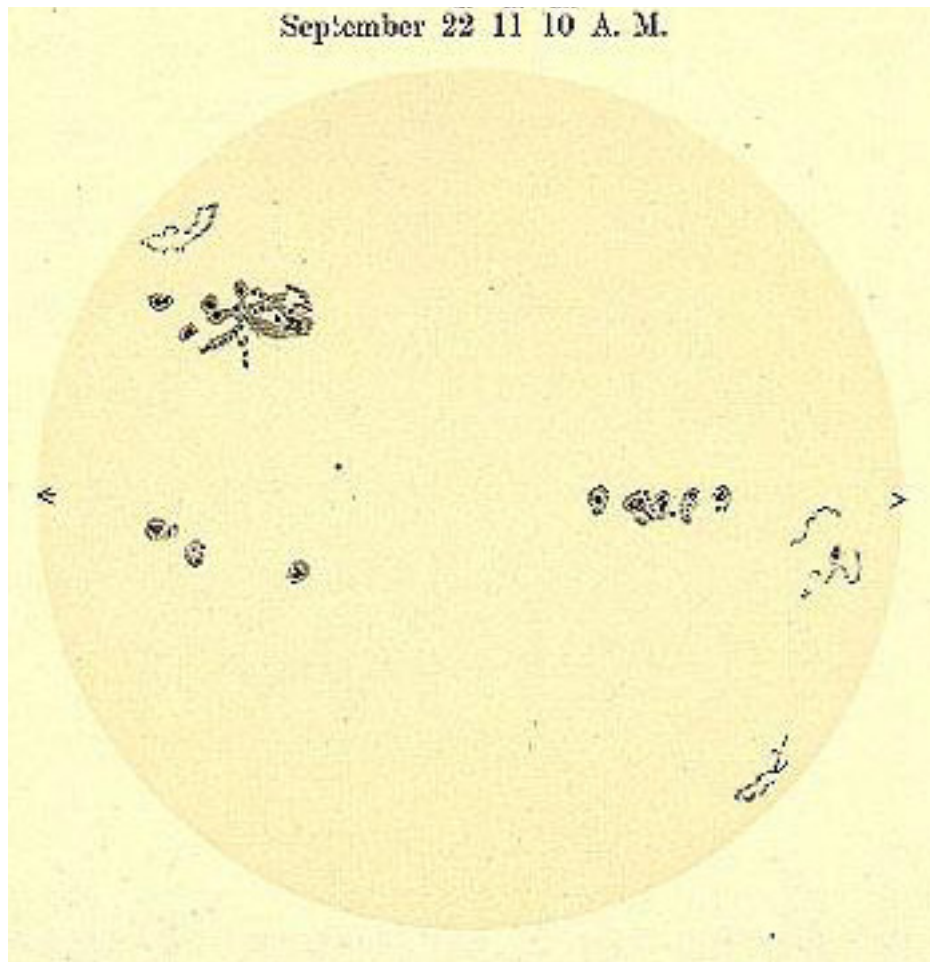
ASTRONOMY

108. If the earth moved for these newlyweds, that of course would need to be put down also as coincidence. Nuptials being transacted, the couple would settle in New-York, where the groom was to write reviews for the [Literary World](#) under Evert Augustus Duyckinck. During this year, publication of *OMOO: A NARRATIVE OF ADVENTURES IN THE SOUTH SEAS*, a narrative found by its audience to be titillatingly suggestive of its creator's sexual adventurousness. There seems to be no evidence that [Henry Thoreau](#) ever glanced at this or any of [Melville](#)'s later works, after his initial perusal of *TYPEE* in the fall of 1846 (Thoreau seems to have stepped past Melville into more original sources such as William Ellis's POLYNESIAN RESEARCHES).

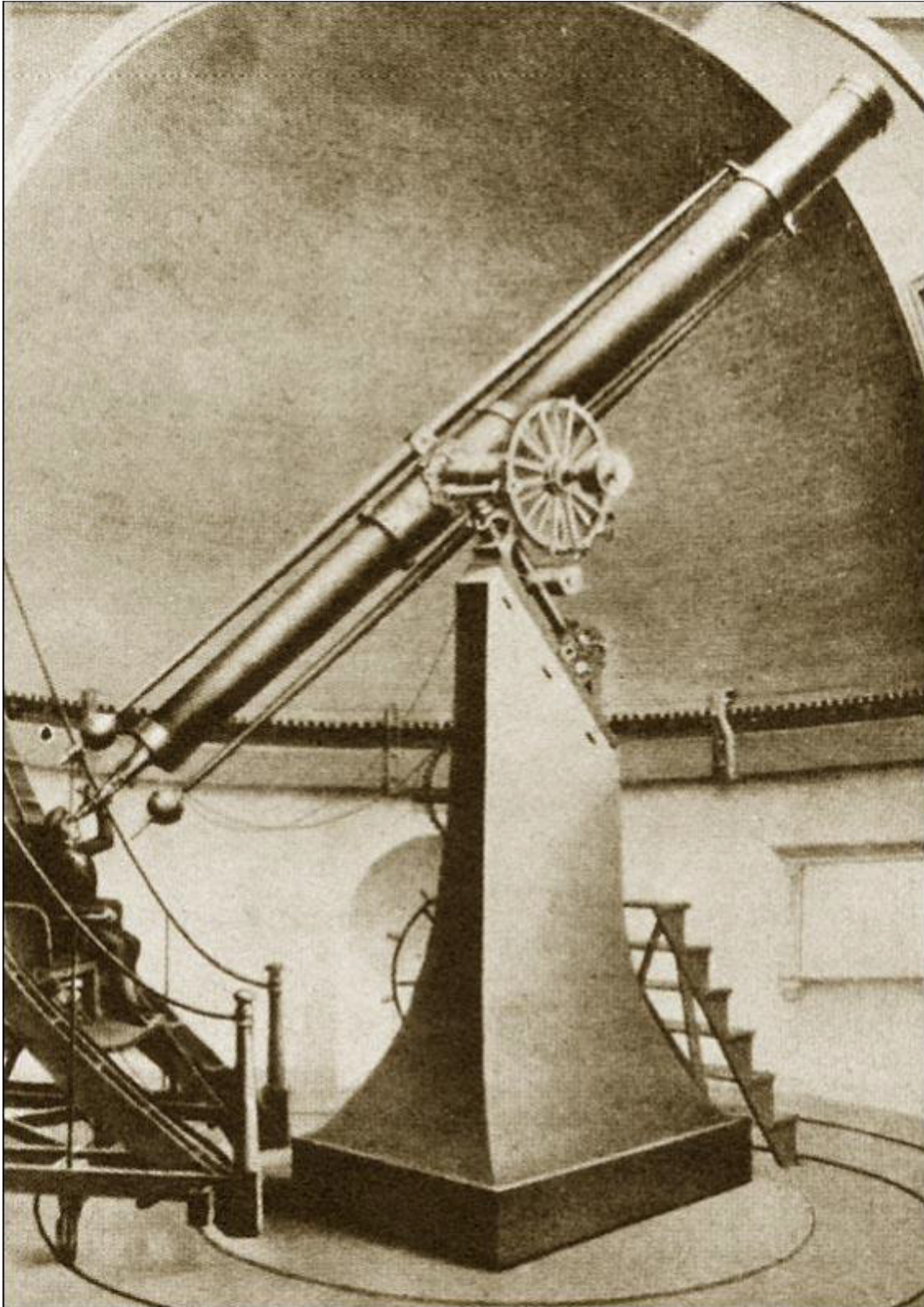
ASTRONOMY

ASTRONOMY

September 22, Wednesday: At 11:10AM in the [Harvard Observatory](#) on Concord Road, [William Cranch Bond](#) made another record by eyepiece projection from his refractor telescope of sunspots as they were moving across the face of the sun:



The [telescope](#) known as “The Great Refractor” that had been ordered in 1843 had arrived from Merz & Mahler of München, Germany and was at this point being installed on Concord Avenue in Cambridge. For two decades this would be the largest and most significant telescope in the United States, equal to the finest in the world. All day there had been frantic activity in preparing this new 15-inch telescope, under the dome at the top of the tower, for its first real observations of deep space.





ASTRONOMY

ASTRONOMY

At 4PM the astronomers had managed to fasten the great object glass into its mounting and obtain a glimpse of the moon, and then:

At 3 1/2 AM Turned the Great Telescope upon the Nebula in Orion – with a power of 180 – ... the revelation was sublime ... the whole appearance of this nebula was altogether different from the representations given in Books....

All the cloudiness of this nebula seemed to have been resolved, in the eye or in the imagination of these astronomers, into a discrete sparkle of pinpricks of light.¹⁰⁹

There is a grandeur, an almost overpowering sublimity in the scene that no language can fully express.

Visitors from the community began standing in line for an hour in order merely to look at Saturn for 30 seconds. The astronomers became concerned that with 400 people crowding into a 30-foot room there would be so much dust raised as eventually to damage this new instrument. Soon the observatory would be closed to the general public, and open only to astronomers, their assistants, and occasional specially invited guests such as [Jenny Lind](#), [Henry Thoreau](#), and [Albert Edward, Prince of Wales](#).

ASTRONOMY

October 1, Friday: On [Nantucket Island](#), the parents of former Friend [Maria Mitchell](#), who had been read out of her monthly [Quaker](#) meeting in 1843 at the age of 25 on account of her tendency toward “questioning,” had a noisy party going with their friends and Maria couldn’t sleep, so she went up onto the roof of the Pacific National Bank of which her dad was head cashier, to look at the sky through her telescope. Five degrees from Polaris, the north star, she detected a spot which did not belong on the standard star map. She had discovered a telescopic [comet](#) (Comet 1847 VI, the modern designation of which is C/1847 T1). The only previous woman to discover a comet had been Caroline Herschel, who had noticed one that was visible to the naked eye. Maria would be honored in America and Europe, with the King of Denmark presenting her with a gold medal.

ASTRONOMY

October 18, Monday: Discovery of a 8th [asteroid](#).

ASTRONOMY

[Margaret Fuller](#) reported to the New-York [Tribune](#) from Rome about Italian patriotism:

Rome, October 18, 1847.

In the spring, when I came to Rome, the people were in the intoxication of joy at the first serious measures of reform taken by the Pope. I saw with pleasure their childlike joy and trust. With equal pleasure I saw the Pope, who has not in his expression the signs of intellectual greatness so much as of nobleness and tenderness of heart, of large and liberal sympathies. Heart had spoken to heart between the prince and the people; it was beautiful to see the immediate good influence exerted by human feeling and generous designs, on the part of a

109. Unfortunately, later observations with higher power instruments have indicated that this nebula in Orion, although it is indeed lighted from inside by individual stars, is quite gaseous and cloudy. These 1847 astronomers were being carried away by their hope for the penetrating power of their big instruments. (It’s a guy thing, right?)

\$200 Reward.

RANAWAY from the subscriber, on the night of Thursday, the 30th of September,

FIVE NEGRO SLAVES,

To-wit: one Negro man, his wife, and three children.

The man is a black negro, full height, very erect, his face a little thin. He is about forty years of age, and calls himself *Washington Reed*, and is known by the name of Washington. He is probably well dressed, possibly takes with him an ivory headed cane, and is of good address. Several of his teeth are gone.

Mary, his wife, is about thirty years of age, a bright mulatto woman, and quite stout and strong.

The oldest of the children is a boy, of the name of *FIELDING*, twelve years of age, a dark mulatto, with heavy eyelids. He probably wore a new cloth cap.

MATILDA, the second child, is a girl, six years of age, rather a dark mulatto, but a bright and smart looking child.

MALCOLM, the youngest, is a boy, four years old, a lighter mulatto than the last, and about equally as bright. He probably also wore a cloth cap. If examined, he will be found to have a swelling at the navel.

Washington and Mary have lived at or near St. Louis, with the subscriber, for about 15 years.

It is supposed that they are making their way to Chicago, and that a white man accompanies them, that they will travel chiefly at night, and most probably in a covered wagon.

A reward of \$150 will be paid for their apprehension, so that I can get them, if taken within one hundred miles of St. Louis, and \$200 if taken beyond that, and secured so that I can get them, and other reasonable additional charges, if delivered to the subscriber, or to *THOMAS ALLEN, Esq.*, at St. Louis, Mo. The above negroes, for the last few years, have been in possession of *Thomas Allen, Esq.*, of St. Louis.

WM. RUSSELL.

ST. LOUIS, Oct. 1, 1847.



ruler. He had wished to be a father, and the Italians, with that readiness of genius that characterizes them, entered at once into the relation; they, the Roman people, stigmatized by prejudice as so crafty and ferocious, showed themselves children, eager to learn, quick to obey, happy to confide. Still doubts were always present whether all this joy was not premature. The task undertaken by the Pope seemed to present insuperable difficulties. It is never easy to put new wine into old bottles, and our age is one where all things tend to a great crisis; not merely to revolution, but to radical reform. From the people themselves the help must come, and not from princes; in the new state of things, there will be none but natural princes, great men. From the aspirations of the general heart, from the teachings of conscience in individuals, and not from an old ivy-covered church long since undermined, corroded by time and gnawed by vermin, the help must come. Rome, to resume her glory, must cease to be an ecclesiastical capital; must renounce all this gorgeous mummary, whose poetry, whose picture, charms no one more than myself, but whose meaning is all of the past, and finds no echo in the future. Although I sympathized warmly with the warm love of the people, the adulation of leading writers, who were so willing to take all from the hand of the prince, of the Church, as a gift and a bounty, instead of implying steadily that it was the right of the people, was very repulsive to me. The moderate party, like all who, in a transition state, manage affairs with a constant eye to prudence, lacks dignity always in its expositions; it is disagreeable and depressing to read them.

Passing into Tuscany, I found the liberty of the press just established, and a superior preparation to make use of it. The *Alba*, the *Patria*, were begun, and have been continued with equal judgment and spirit. Their aim is to educate the youth, to educate the lower people; they see that this is to be done by promoting thought fearlessly, yet urge temperance in action, while the time is yet so difficult, and many of its signs dubious. They aim at breaking down those barriers between the different states of Italy, relics of a barbarous state of polity, artificially kept up by the craft of her foes. While anxious not to break down what is really native to the Italian character, – defences and differences that give individual genius a chance to grow and the fruits of each region to ripen in their natural way, – they aim at a harmony of spirit as to measures of education and for the affairs of business, without which Italy can never, as one nation, present a front strong enough to resist foreign robbery, and for want of which so much time and talent are wasted here, and internal development almost wholly checked.

There is in Tuscany a large corps of enlightened minds, well prepared to be the instructors, the elder brothers and guardians, of the lower people, and whose hearts burn to fulfil that noble office. Before, it had been almost impossible to them, for the reasons I have named in speaking of Lombardy; but during these last four months that the way has been opened by the freedom of the press, and establishment of the National Guard, – so valuable, first of all, as giving occasion for public meetings and free interchange of thought between the different



classes, – it is surprising how much light they have been able to diffuse.

A Bolognese, to whom I observed, "How can you be so full of trust when all your hopes depend, not on the recognition of principles and wants throughout the people, but on the life of one mortal man?" replied: "Ah! but you don't consider that his life gives us a chance to effect that recognition. If Pius IX. be spared to us five years, it will be impossible for his successors ever to take a backward course. Our nation is of a genius so vivacious, – we are unhappy, but not stupid, we Italians, – we can learn as much in two months as other nations in twenty years." This seemed to me no brag when I returned to Tuscany and saw the great development and diffusion of thought that had taken place during my brief absence. The Grand Duke, a well-intentioned, though dull man, had dared, to declare himself "*an ITALIAN prince*" and the heart of Tuscany had bounded with hope. It is now deeply as justly felt that *the* curse of Italy is foreign intrusion; that if she could dispense with foreign aid, and be free from foreign aggression, she would find the elements of salvation within herself. All her efforts tend that way, to re-establish the natural position of things; may Heaven grant them success! For myself, I believe they will attain it. I see more reason for hope, as I know more of the people. Their rash and baffled struggles have taught them prudence; they are wanted in the civilized world as a peculiar influence; their leaders are thinking men, their cause is righteous. I believe that Italy will revive to new life, and probably a greater, one more truly rich and glorious, than at either epoch of her former greatness. During the period of my absence, the Austrians had entered Ferrara. It is well that they hazarded this step, for it showed them the difficulties in acting against a prince of the Church who is at the same time a friend to the people. The position was new, and they were probably surprised at the result, – surprised at the firmness of the Pope, surprised at the indignation, tempered by calm resolve, on the part of the Italians. Louis Philippe's mean apostasy has this time turned to the advantage of freedom. He renounced the good understanding with England which it had been one of the leading features of his policy to maintain, in the hope of aggrandizing and enriching his family (not France, he did not care for France); he did not know that he was paving the way for Italian freedom. England now is led to play a part a little nearer her pretensions as the guardian of progress than she often comes, and the ghost of La Fayette looks down, not unappeased, to see the "Constitutional King" decried by the subjects he has cheated and lulled so craftily. The king of Sardinia is a worthless man, in whom nobody puts any trust so far as regards his heart or honor; but the stress of things seems likely to keep him on the right side. The little sovereigns blustered at first, then ran away affrighted when they found there was really a spirit risen at last within the charmed circle, – a spirit likely to defy, to transcend, the spells of haggard premiers and imbecile monarchs.

I arrived in Florence, unhappily, too late for the great fête of the 12th of September, in honor of the grant of a National Guard. But I wept at the mere recital of the events of that day, which, if it should lead to no important results, must still be



hallowed for ever in the memory of Italy, for the great and beautiful emotions that flooded the hearts of her children. The National Guard is hailed with no undue joy by Italians, as the earnest of progress, the first step toward truly national institutions and a representation of the people. Gratitude has done its natural work in their hearts; it has made them better. Some days before the fête were passed in reconciling all strifes, composing all differences between cities, districts, and individuals. They wished to drop all petty, all local differences, to wash away all stains, to bathe and prepare for a new great covenant of brotherly love, where each should act for the good of all. On that day they all embraced in sign of this, – strangers, foes, all exchanged the kiss of faith and love; they exchanged banners, as a token that they would fight for, would animate, one another. All was done in that beautiful poetic manner peculiar to this artist people; but it was the spirit, so great and tender, that melts my heart to think of. It was the spirit of true religion, – such, my Country! as, welling freshly from some great hearts in thy early hours, won for thee all of value that thou canst call thy own, whose groundwork is the assertion, still sublime though thou hast not been true to it, that all men have equal rights, and that these are *birth*-rights, derived from God alone.

I rejoice to say that the Americans took their share on this occasion, and that Greenough – one of the few Americans who, living in Italy, takes the pains to know whether it is alive or dead, who penetrates beyond the cheats of tradesmen and the cunning of a mob corrupted by centuries of slavery, to know the real mind, the vital blood, of Italy – took a leading part. I am sorry to say that a large portion of my countrymen here take the same slothful and prejudiced view as the English, and, after many years' sojourn, betray entire ignorance of Italian literature and Italian life, beyond what is attainable in a month's passage through the thoroughfares. However, they did show, this time, a becoming spirit, and erected the American eagle where its cry ought to be heard from afar, – where a nation is striving for independent existence, and a government representing the people. Crawford here in Rome has had the just feeling to join the Guard, and it is a real sacrifice for an artist to spend time on the exercises; but it well becomes the sculptor of Orpheus, – of him who had such faith, such music of divine thought, that he made the stones move, turned the beasts from their accustomed haunts, and shamed hell itself into sympathy with the grief of love. I do not deny that such a spirit is wanted here in Italy; it is everywhere, if anything great, anything permanent, is to be done. In reference to what I have said of many Americans in Italy, I will only add, that they talk about the corrupt and degenerate state of Italy as they do about that of our slaves at home. They come ready trained to that mode of reasoning which affirms that, because men are degraded by bad institutions, they are not fit for better.

As to the English, some of them are full of generous, intelligent sympathy; – indeed what is more solidly, more wisely good than the right sort of Englishmen! – but others are like a gentleman I travelled with the other day, a man of intelligence and refinement too as to the details of life and outside culture,



who observed, that he did not see what the Italians wanted of a National Guard, unless to wear these little caps. He was a man who had passed five years in Italy, but always covered with that non-conductor called by a witty French writer "the Britannic fluid."

Very sweet to my ear was the continual hymn in the streets of Florence, in honor of Pius IX. It is the Roman hymn, and none of the new ones written in Tuscany have been able to take its place. The people thank the Grand Duke when he does them good, but they know well from whose mind that good originates, and all their love is for the Pope. Time presses, or I would fain describe in detail the troupe of laborers of the lower class, marching home at night, keeping step as if they were in the National Guard, filling the air, and cheering the melancholy moon, by the patriotic hymns sung with the mellow tone and in the perfect time which belong to Italians. I would describe the extempore concerts in the streets, the rejoicings at the theatres, where the addresses of liberal souls to the people, through that best vehicle, the drama, may now be heard. But I am tired; what I have to write would fill volumes, and my letter must go. I will only add some words upon the happy augury I draw from the wise docility of the people. With what readiness they listened to wise counsel, and the hopes of the Pope that they would give no advantage to his enemies, at a time when they were so fevered by the knowledge that conspiracy was at work in their midst! That was a time of trial. On all these occasions of popular excitement their conduct is like music, in such order, and with such union of the melody of feeling with discretion where to stop; but what is wonderful is that they acted in the same manner on that difficult occasion. The influence of the Pope here is without bounds; he can always calm the crowd at once. But in Tuscany, where they have no such idol, they listened in the same way on a very trying occasion. The first announcement of the regulation for the Tuscan National Guard terribly disappointed the people; they felt that the Grand Duke, after suffering them to demonstrate such trust and joy on the feast of the 12th, did not really trust, on his side; that he meant to limit them all he could. They felt baffled, cheated; hence young men in anger tore down at once the symbols of satisfaction and respect; but the leading men went among the people, begged them to be calm, and wait till a deputation had seen the Grand Duke. The people, listening at once to men who, they were sure, had at heart their best good, waited; the Grand Duke became convinced, and all ended without disturbance. If they continue to act thus, their hopes cannot be baffled. Certainly I, for one, do not think that the present road will suffice to lead Italy to her goal. But it is an onward, upward road, and the people learn as they advance. Now they can seek and think fearless of prisons and bayonets, a healthy circulation of blood begins, and the heart frees itself from disease.

I earnestly hope for some expression of sympathy from my country toward Italy. Take a good chance and do something; you have shown much good feeling toward the Old World in its physical difficulties, — you ought to do still more in its spiritual endeavor. This cause is OURS, above all others; we ought to show that we feel it to be so. At present there is no likelihood of



war, but in case of it I trust the United States would not fail in some noble token of sympathy toward this country. The soul of our nation need not wait for its government; these things are better done by individuals. I believe some in the United States will pay attention to these words of mine, will feel that I am not a person to be kindled by a childish, sentimental enthusiasm, but that I must be sure I have seen something of Italy before speaking as I do. I have been here only seven months, but my means of observation have been uncommon. I have been ardently desirous to judge fairly, and had no prejudices to prevent; beside, I was not ignorant of the history and literature of Italy, and had some common ground on which to stand with, its inhabitants, and hear what they have to say. In many ways Italy is of kin to us; she is the country of Columbus, of Amerigo, of Cabot. It would please me much to see a cannon here bought by the contributions of Americans, at whose head should stand the name of Cabot, to be used by the Guard for salutes on festive occasions, if they should be so happy as to have no more serious need. In Tuscany they are casting one to be called the "Gioberti," from a writer who has given a great impulse to the present movement. I should like the gift of America to be called the AMERIGO, the COLUMBO, or the WASHINGTON. Please think of this, some of my friends, who still care for the eagle, the Fourth of July, and the old cries of hope and honor. See if there are any objections that I do not think of, and do something if it is well and brotherly. Ah! America, with all thy rich boons, thou hast a heavy account to render for the talent given; see in every way that thou be not found wanting.

ARTHUR FULLER'S BOOK

October 23, Saturday: A first attempt was made at the [Harvard Observatory](#) to take a Daguerreotype of the sun and moon. The astronomer burned a hole through his "coat sleeve" and felt a stab of heat "so intense that we consider'd it most prudent to refrain for the present."

ASTRONOMY

October 24, Sunday: [Henry Thoreau](#) wrote to [Sophia Elizabeth Thoreau](#).

Concord Oct 24th —47

Dear Sophia

I thank you for those letters about Ktadn and hope you will save and send me the rest and anything else you may meet with relating to the Maine woods. That Dr Young is both young and green too at traveling in the woods. However I hope he got "yarbs" enough to satisfy him.— I went to Boston the 5th of this month to see Mr Emerson off to Europe. He sailed in the Washington Irving packet ship, the same in which Mr Hedge went before him. Up to this trip, the first mate aboard this ship, was as I hear, one Stephens, a Concord boy — son of Stephens the carpenter who used to live above Mr. Dennis' — Mr E's state-room was like a carpeted dark closet, about six feet square, with a large key-hole for a window. The window was about as big as



a saucer and the glass 2 inches thick. —not to mention another sky-light over head in the deck, of the size of an oblong doughnut and about as opaque; of course it would be in vain to look up if any contemplative promenader had his foot upon it. Such will be his lodgings for two or three weeks — and instead of a walk in Walden woods, he will take a promenade on deck, where the few trees you know are stript of their bark. The steam tug carried the ship to sea against a head wind, without a rag of sail being raised.

I dont remember whether you have heard of the new telescope at Cambridge or not. They think it is the best one in the world — and have already seen more than Lord Ross or Herschel. I went to see Perez Blood's some time ago with Mr E. He had not gone to bed, but was sitting in the wood shed in the dark alone, in his astronomical chair, which is all legs and rungs, with a seat which can be inserted at any height, we saw Saturn's ring, and the mountains in the moon, and the shadows in their craters and the sun light on the spurs of the Mts in the dark portion. &c &c When I asked him the power of his glass, he said it was 85 But what is the power of the Cambridge glass? 2000!!! The last is about 23 feet long.

I think you may have a grand time this winter pursuing some study —keeping a Journal, or the like— while the snow lies deep with out— Winter is the time for study, you know, and the colder it is the more studious we are.

Give my respects to the whole Penobscot tribe, and tell them that I trust we are good brothers still, and endeavor to keep the chain of friendship bright — though I do dig up a hatchet now & then.

—I trust you will not stir from your comfortable winter quarters — Miss Bruin— or even put your head out of your hollow tree, till the sun has melted the snow in the Spring, and “the green buds, they are a swellin.”

from your

Brother Henry.

ASTRONOMY
HARVARD OBSERVATORY

1848

By this point the process pioneered by Robert Lucas Chance for the production of mirror plate glass was the one that was routinely used.

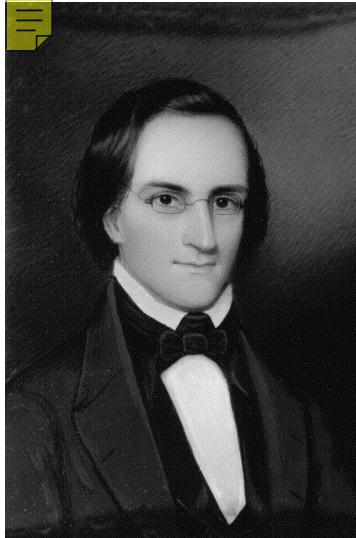
According to Warren Scoville's REVOLUTION IN GLASS MAKING, only “[s]ome of the wealthiest people in Boston had begun to use polished plate glass instead of sheet glass in their front windows before 1850.”¹¹⁰

GLASS WINDOWS

ASTRONOMY

ASTRONOMY

[Benjamin Apthorp Gould](#) earned the PhD degree at the University of Göttingen, in [astronomy](#). He had already published some 20 papers on comets and asteroids.



Rudolf Wolf began keeping systematic records of individual [sunspots](#) and of spot groupings. Wolf would

110. However, in England, [Friend](#) John [Cadbury](#) of [chocolate](#) fame had installed in the front of his shop a window made of panes of plate glass rather than panes of crown glass, by about 1832:



consult the historical record in an attempt to establish a database on cyclic variations of the past.



January: When the eclipses of the moons of Jupiter had been carefully timed, it became possible to derive a rule from which could be predicted the precise instant at which each moon was to glide into the shadow of the planet and wink out of our view, and the precise instant at which it was to make its reappearance. The rule had it that these disappearances and appearances happened $16\frac{1}{2}$ minutes sooner while the planet Jupiter was on our side of the solar system than when it was beyond the sun, on the far side of the solar system. It was possible on this basis to ascertain that the light from the sun travels for $8\frac{1}{4}$ minutes to reach the earth.

ASTRONOMY

April 25, Tuesday night: A 9th [asteroid](#) was discovered.

ASTRONOMY

July 28: Eight days after the conclusion of the Women's Rights Convention at Seneca Falls, New York, Frederick Douglass provided a favorable glimpse¹¹¹ in his Rochester The North Star:





ASTRONOMY

ASTRONOMY

One of the most interesting events of the past week, was the holding of what is technically styled a Woman's Rights Convention at Seneca Falls. The speaking, addresses, and resolutions of this extraordinary meeting was wholly conducted by women; and although they evidently felt themselves in a novel position, it is but simple justice to say that their whole proceedings were characterized by marked ability and dignity. No one present, we think, however much he might be disposed to differ from the views advanced by the leading speakers on that occasion, will fail to give them credit for brilliant talents and excellent dispositions. In this meeting, as in other deliberative assemblies, there were frequent differences of opinion and animated discussion; but in no case was there the slightest absence of good feeling and decorum. Several interesting documents setting forth the rights as well as the grievances of women were read. Among these was a Declaration of Sentiments, to be regarded as the basis of a grand movement for attaining the civil, social, political, and religious rights of women. We should not do justice to our own convictions, or to the excellent persons connected with this infant movement, if we did not in this connection offer a few remarks on the general subject which the Convention met to consider and the objects they seek to attain. In doing so, we are not insensible that the bare mention of this truly important subject in any other than terms of contemptuous ridicule and scornful disfavor, is likely to excite against us the fury of bigotry and the folly of prejudice. A discussion of the rights of animals would be regarded with far more complacency by many of what are called the "wise" and the "good" of our land, than would a discussion of the rights of women. It is, in their estimation to be guilty of evil thoughts, to think that woman is entitled to equal rights with man. Many who have at last made the discovery that the negroes have some rights as well as other members of the human family, have yet to be convinced that women are entitled to any. Eight years ago a number of persons of this description actually abandoned the anti-slavery cause, lest by giving their influence in that direction they might possibly be giving countenance to the dangerous heresy that woman, in respect to rights, stands on an equal footing with man. In the judgment of such persons the American slave system, with all its concomitant horrors, is less to be deplored than this "wicked" idea. It is perhaps needless to say, that we cherish little sympathy for such sentiments or respect for such prejudices. Standing as we do up on the watch-tower of human freedom, we cannot be deterred from an expression of our approbation of any movement, however humble, to improve and elevate the character of any members of the human family. While it is impossible for us to go into this subject at length, and dispose of the various objections which are often urged against such a doctrine as that of female equality, we are free to say that in respect to political rights, we hold woman to be justly entitled to all we claim for man. We go farther, and express our conviction that all political rights which it is expedient for man to exercise, it is equally for

111. During the month of August, a followup Women's Rights Convention would be held in Rochester, New York, passing a resolution to have the word "obey" struck from the marriage vows. A letter from abolitionist Gerrit Smith would there be read, expressing his support.



ASTRONOMY

ASTRONOMY

woman. All that distinguishes man as an intelligent and accountable being, is equally true of woman, and if that government only is just which governs by the free consent of the governed, there can be no reason in the world for denying to woman the exercise of the elective franchise, or a hand in making and administering the laws of the land. Our doctrine is that "right is of no sex." We therefore bid the women engaged in this movement our humble Godspeed.

September 16, Saturday: Pope Pius IX appointed Pellegrino Rossi as prime minister to deal with certain republican tendencies of the citizenry.

Faced by Prussian pressure, the Frankfurt Assembly reversed itself and endorsed the armistice with Denmark.

William Cranch Bond's son [George Phillips Bond](#), one of the "assistant observers" at the [Harvard Observatory](#), discovered the 8th [satellite](#) of Saturn, now named Hyperion.¹¹²

ASTRONOMY

September 19, Tuesday: On the planet Earth, the existence of an 8th [satellite](#) of Saturn, now named Hyperion, was announced.

112. We now refer to him not as the son of the father but as "the father of celestial photography."
(In England, William Lassell of Liverpool was independently discovering this Hyperion satellite, which was the 2d moon of Saturn to be identified from Earth.)

ASTRONOMY

ASTRONOMY

ASTRONOMY

December 3 [SHOULD THIS BE DECEMBER 1847??] Frederick Douglass has invested £445¹¹³ raised by British and Irish supporters in hiring Martin Robison Delany as co-editor and beginning a third antislavery publication. Because the Liberator is published in Boston and the National Anti-Slavery Standard in New York City, covering the Eastern Seaboard, Douglass wisely chooses to begin the new paper in Rochester NY where he has not only friends but greater freedom from head-on competition. On this date the new paper, the North Star, first appeared:



Its motto would be:

RIGHT IS OF NO SEX — TRUTH IS OF NO COLOR — GOD IS THE FATHER OF US ALL, AND WE ARE ALL BRETHREN.



ASTRONOMY

ASTRONOMY

1849

THE RHODE-ISLAND [ALMANAC](#) FOR 1849. By Isaac Bickerstaff. [Providence, Rhode Island](#): Hugh H. Brown.

THE PROVIDENCE [ALMANAC](#) FOR 1849.

[Henry Thoreau](#) had in his personal library the 1846, 1849, 1850, and 1851 issues of AMERICAN [ALMANAC](#) AND REPOSITORY OF USEFUL KNOWLEDGE (Boston: Grey & Bowen).

ALMANAC FOR 1846

ALMANAC FOR 1849

ALMANAC FOR 1850

ALMANAC FOR 1851

ASTRONOMY

ASTRONOMY

A 7th edition of Ormsby McKnight Mitchel, A.M.'s revision to [Elijah Hinsdale Burritt](#), A.M.'s THE GEOGRAPHY OF THE HEAVENS, AND CLASS BOOK OF [ASTRONOMY](#); ACCOMPANIED BY A CELESTIAL ATLAS. BY ELIJAH H. BURRITT, A.M. FIFTH EDITION. WITH AN INTRODUCTION BY THOMAS DICK, LL.D., AUTHOR OF THE "CHRISTIAN PHILOSOPHER," &C (New York).

[Benjamin Apthorp Gould](#) started the Astronomical Journal. He would publish this until 1861, and then resume publication in 1885 (the journal still exists).

In this year, [Maria Mitchell](#) became the 1st woman to be employed fulltime by the US Nautical Almanac — she was to become a Computer (that's a job title, like Janitor or Comptroller or Typewriter or Engineer), and assist in computation of the ephemerides of Venus.



In this year William Brewster linked the stereoscope, invented in 1838 by Charles Wheatstone, with the new science of photography, so that eventually it might become possible to make 3-dimensional photographs of the moon.

ASTRONOMY

In this year, discovery of a 10th [asteroid](#).

ASTRONOMY



Armand Hypolite Louis Fizeau of France, by means of a rotating toothed wheel that broke up a light beam into a regular series of pulses, was able to make the 1st non-astronomical approximation of the speed of light through air. A value of 313,300 kilometers/second⁻¹ was obtained.

HISTORY OF OPTICS



After May 26: Of some men the eye is the predominant feature— They are seers— Their presence is a constraint They see all that is done though their backs appear to be turned— Of others it is the ear They hear all that is said though they appear to give no heed.

The eyes are quick but their glances may be detected The ears do not betray their attention.

The former observe the signs of the future —the others hear the strains of the muse.— Of the former you shall not say that they are ignorant for they have seen —nor of the latter that they are ignorant for they have heard.

The fragments of fables handed down to us from The remotest antiquity in the mythologies and traditions of all nations would seem to indicate that the life of Christ his divine preeminence & his miracles are not without a precedent in the history of mankind.— Brahma Indeed such lives are but the epochs in history though ancient and mod. hist. or as they should both be called mod. hist may not be able to span the interval between two such epochs or eras. All the gods that are worshipped have been men —but of the true God of whom none have conceived —all men combined would hardly furnish the germ.

A Sister

One in whom you have —unbounded faith —whom you can —purely love. A sweet presence and companion making the world populous Whose heart answers to your heart. Whose presence can fill all space. One who is a spirit. Who attends to your truth. A gentle spirit —a wise spirit —a loving spirit. An enlargement to your being. Level to yourself Whom you can know A great heart An integral portion of God. The stream of whose being unites with your own without a ripple or a murmur. & they spread into a sea.

I still think of you as my sister. I presume to know you. Others are of my kindred by blood or of my acquaintance but you are mine. you are of me & I of you I can not tell where I leave off and you begin.— there is such a harmony when your sphere meets mine To you I can afford to be forever what I am, for your presence will not permit me to be what I should not be.

He whom we associate with our daily affairs is our acquaintance He whom we associate with our social joys is what the world commonly call our friend— He whom we associate with our elysium is beloved by us. My sister, whom I love I almost have no more to do with. I shall know where to find her It is those whom I do not love who concern me —and make affairs for me. What can I ask of my sister that she will do only that she will never be less than she is, that so I may be more. Persevere. I have intelligence with her as often as I am her brother —& as long. I know her in spirit and in truth. I can more heartily meet her when our bodies are away I see her without the veil of the body. When I commune with her I forget to speak.— An imbodiment of truth — of goodness of sincerity & love Why will we add to our farms & not add to our sky our heavens I may add a soul to mine.

When I love you I feel as if I were annexing another world to mine. We splice the heavens. Can there be a rich man who does not own a friend?

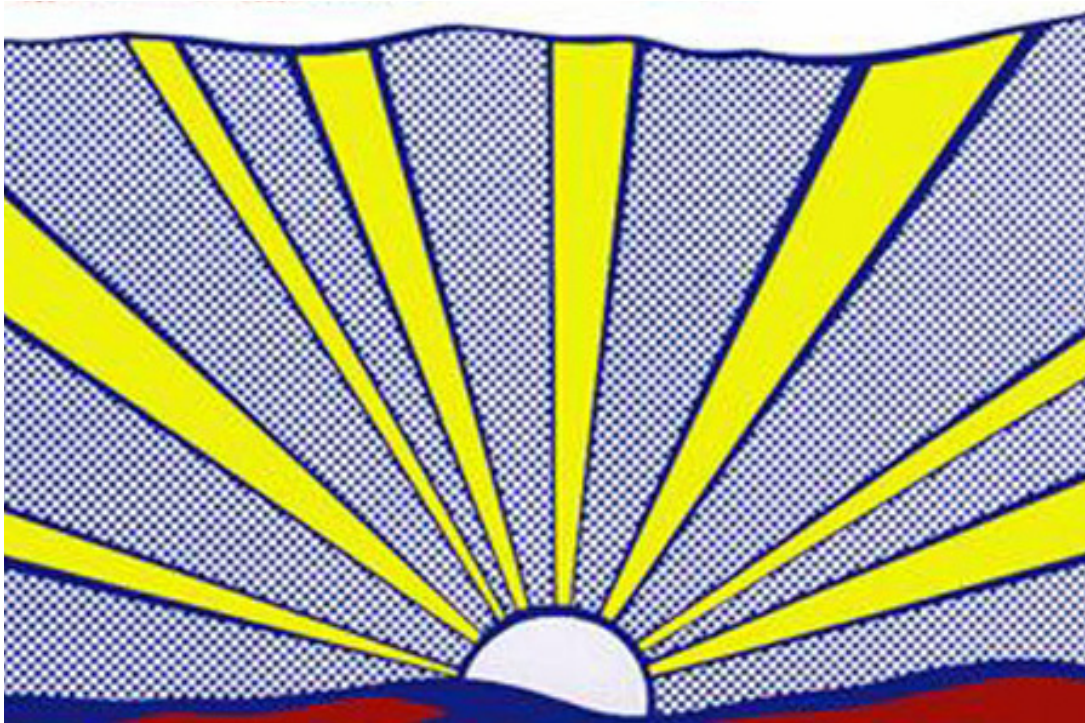
My sister, it is glorious to me that you live. Thou art a hushed music to me —a thousand melodies commingled and filling the air. Thou art transfigured to me, and I see a perfect being— O Do not disappoint me.

Whose breath is as gentle and salubrious as a zephyr's whisper Whom I know as an atmosphere. Who art dear to me— A Sicilian atmosphere. Whom in thought my spirit continually embraces. Into whom I flow Who is not separated from me.

Who art clothed in white Who comest like an incense. Who art all that I can imagine —my inspirer. The feminine of me— Who art magnanimous

It is morning when I meet thee in a still cool dewy white sun light In the hushed dawn —my young mother —I thy eldest son —who art refreshing as the first breath of the morning —who speakest above the breathing of the crickets with an Aroral breath. Whether art thou my mother or my sister —whether am I thy son or thy brother.

On the remembrance of whom I repose— — So *old* a sister art thou —so newly hast thou recreated me. Who speakest never colored words —who art not possessed by a demon. Who dwellest in the morning light whose eyes are like [the morning star](#) Who comest to me in the morning twilight



I have a friend, whom I heartily love, Whom I would always treat tenderly Who indeed is so transfigured to me that I dare not identify thy ideal with the actual The fit time has never come for that. If I could believe that my friend would tenderly and wisely enough sustain the declaration of my love I should make him privy to my dreams, but I fear that some more terrestrial cousin may be introduced, that if ideals can thus commingle, actuals will begin to obtrude themselves.

I am afraid to contrast my dreams so rudely with the actual day –to tell them by daylight –(I was never so near my friend when he was bodily present as when he was absent) and yet I am And yet I am indirectly accused by this friend of coldness and disingenuousness– When I cannot speak for warmth –& sincerity.

If what I might tell my friend is what he does not already know –it will no longer be true when I have told it. I do desire nothing so much as to tell my love –yet as my love is rare so is the opportunity to declare it. Can it be that my friend is but a suggestion & hint of a friend whom I have never seen.

Is it a use I make of my friends which necessarily transcends their privacy (consciousness)?– They sometimes even demand to be admitted to my solitary joy –ask why I smile –but I see too plainly –that if I degraded my ideal to an identity with any actual mortal whose hand is to be grasped there would be an end of our fine relations. I would be related to my friend by the most etherial part of our natures alone –and what else is quite obedient to this.

I learned this by my experiments in the woods, of more value perhaps than all the rest –that if one will advance confidently in the direction of his dreams, and live that life which he has imagined– If he will walk the water, if he will step forth on to the clouds if he will heartily embrace the true, if in his life he will transcend the temporal– (He shall walk securely –perfect success shall attend him, there shall be the terra firma or the coelum firmior–) If he will do that in which alone he has faith, if he will yield to love and go whither it leads him) He shall be translated –he shall know no interval he shall be surrounded by new environments, new and more universal & libereal laws shall {*MS torn*} establish themselves around & within

August: On the farm of Balvullich occupied by a Mr. Moffat, on the estate of Ord in Scotland, there was an exceedingly loud thunderclap and a large block of ice fell from the sky. It was measured as some 20 feet in circumference, and had “a beautiful crystalline appearance being nearly all quite transparent, if we except a small portion of it which consisted of hailstones of uncommon size, fixed together. It was principally composed of small squares, diamond-shaped, of from 1 to 3 inches in size, all firmly congealed together.” There was no accompanying hailstorm or snow.

ASTRONOMY

ASTRONOMY

September 1, Saturday: A California Constitutional Convention was held in Monterey.

The 1st surviving astronomical photograph, several images of the full moon made without the assistance of a [telescope](#), was made by S.D. Humphrey at Canandaigua, New York. The multiple exposures were made at 1/2, 1, 2, 3 (the best), 5, 15, 30, and 60 seconds, and the elongated image at the top is an exposure of 2 minutes.

ASTRONOMY

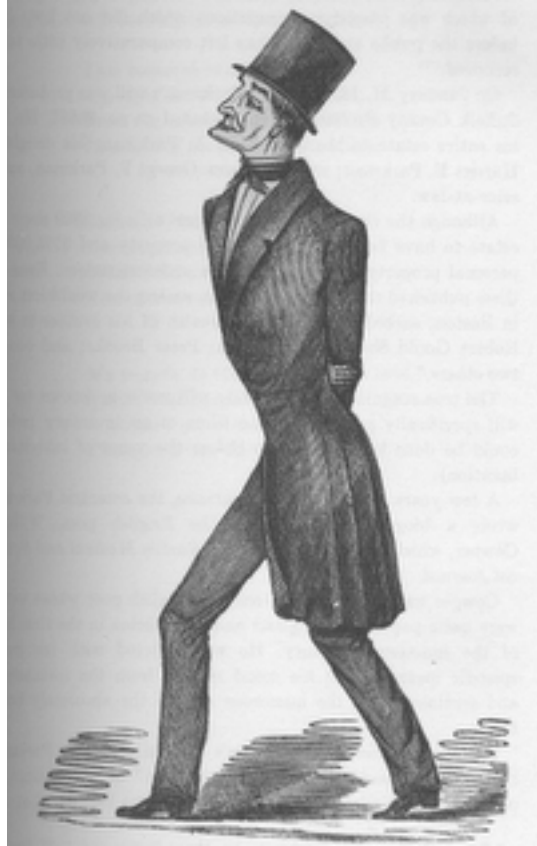


(Earlier images, the one made by Daguerre on the night of January 2, 1839, and the one made by Dr. John Draper during March 1840, have been lost to fire.)

ASTRONOMY

ASTRONOMY

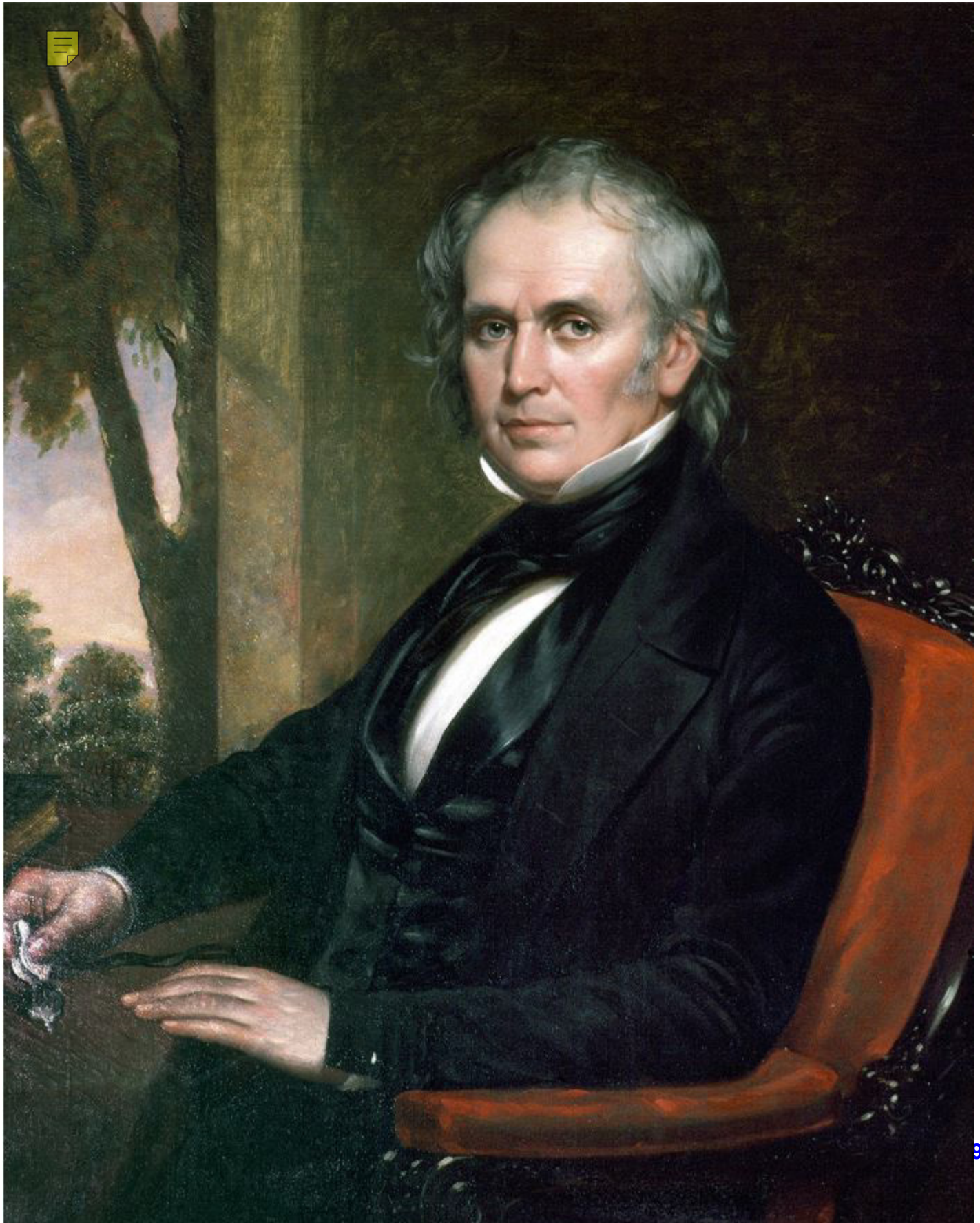
November 23, Friday afternoon: [Doctor George Parkman](#) had called at the clock shop of William Bond and Son to pay part of a bill, and had promised to return in the afternoon but did not do so.



This was the shop which was producing the cash flow which was enabling the Bonds to run the [Harvard Observatory](#) without any salaries. When it later turned out to be his friend and colleague [Professor John White Webster](#) the chemistry professor of the medical college who was arrested for the murder of Doctor Parkman, however, [William Cranch Bond](#) was defensive and incredulous:

We who are intimately acquainted with Doctor Webster cannot harbor a suspicion of the kind for an instant.

Doctor Parkman was then seen at the Massachusetts Hospital on Allen Street (now Massachusetts General), and that was the last recorded sighting. From the later bill of indictment, we learn that one account of what happened that Friday afternoon at the [Harvard Medical College](#) was that “John White Webster with a certain knife which he then and there in his right hand had held, the said George Parkman then and there feloniously willfully and of his malice aforethought did strike, beat and kick upon the head, breast, back and belly, sides and other parts of him, the said George Parkman and then and there feloniously willfully and with malice aforethought did cast and throw the said George Parkman down unto and upon the floor with great force and violence there giving unto the said George Parkman then and there as well as by the beating, stabbing, striking and kicking of him several mortal wounds and bruises in and upon the head, breast, belly and other sides of

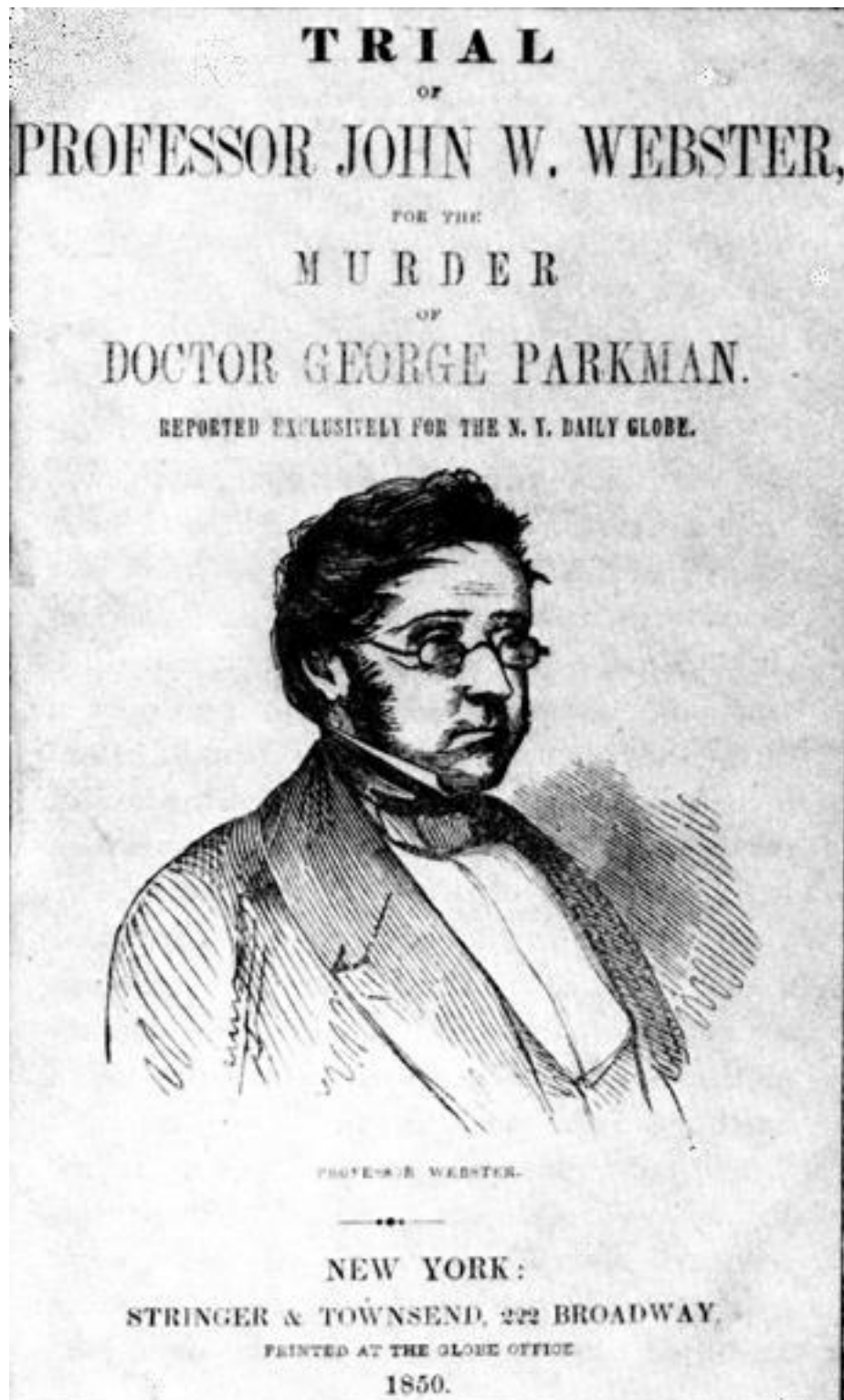




ASTRONOMY

ASTRONOMY

the body ... of which said mortal strokes, wounds and bruises he the said George Parkman then and there instantly died.” From the “confession” which the Unitarian minister, the Reverend George Putnam said that [Professor John White Webster](#) had made to him in his jail cell after being condemned to death by hanging, we learn that another account of what happened that Friday afternoon at the [Harvard Medical College](#) was that Doctor Parkman was waving a copy of the letter of recommendation which he had originally prepared to help Doctor Webster obtain an appointment on the Harvard faculty many years before, and had said to Doctor Webster “I got you into your position and now I will get you out of it.” Whereupon Doctor Webster became enraged and fearful and, grabbing up a stump of grapevine from the stovewood, whacked [Doctor George Parkman](#) once solidly along the side of the head, killing him instantly.





ASTRONOMY

ASTRONOMY

December 18, Tuesday, evening: “On the evening of the 18th just as we were commencing observations on [Mars](#), Messrs [John Adams] Whipple¹¹⁴ and [William B.] Jones came to take a Daguerreotype of the Moon.”

ASTRONOMY

(This is the first surviving exposure made of the moon with the assistance of a [telescope](#), although there is in existence a Daguerreotype exposure made on the night of September 1, 1849 that was without the assistance of a telescope.)

114. The inventor John Adams Whipple had been born in Grafton, Massachusetts on September 10, 1822. Having studied chemistry, when the Daguerreotype process came along, he went into the business of manufacturing the requisite chemicals. Having damaged his health through this chemical work, he devoted himself to making improvements in the photographic process. He used steam to prepare his plates and bring out their images, invented crayon daguerreotypes and daguerreotypes on glass, and, with the aid of the staff of the [Harvard Observatory](#) and its 15-inch equatorial telescope, made state-of-the-art Daguerreotypes of the Moon and of the star Alpha Lyra.

1850

MITCHEL'S [BURRITT'S](#) GEOGRAPHY OF THE HEAVENS. COMPRISING TWENTY-FOUR STAR CHARTS,... EDITED BY O.M. MITCHEL, A.M. DIRECTOR OF THE CINCINNATI OBSERVATORY.... Huntington and Savage. New York.

ASTRONOMY



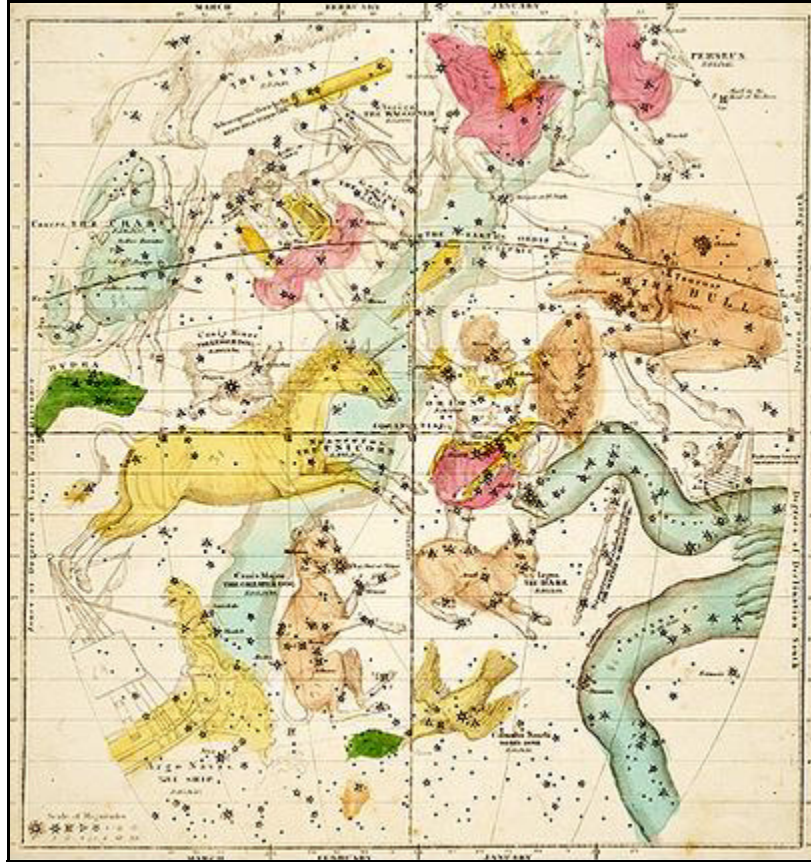
GEOGRAPHY OF HEAVENS

ATLAS, DESIGNED TO ILLUSTRATE THE GEOGRAPHY OF THE HEAVENS, COMPRISING THE FOLLOWING MAPS OR

ASTRONOMY

ASTRONOMY

PLATES... A NEW EDITION, REVISED AND CORRECTED. BY HIRAM MATTISON, A.M.¹¹⁵. New York.



J.L. Foucault of France using a rotating mirror to measure the speed of light through air. A value of 298,000 kilometers/second⁻¹ was obtained, rather than the 313,300 kilometers/second⁻¹ that had been obtained in the previous year by use of another method. Foucault also in this year used his rotating-mirror apparatus to measure the speed of light through stationary water, finding that to be slower than through air.

HISTORY OF OPTICS

115. The Reverend Hiram Mattison had been born in Norway, New York on February 11, 1811, had become a Methodist minister in 1835, had begun to serve as a New Jersey agent of the American Bible Society in 1841, and had then resumed pastoral work in 1842 in Watertown and in Rome, New York. In 1843 he had authored THE TRINITY AND MODERN ARIANISM and TRACTS FOR THE TIMES. In 1846 he had prepared ELEMENTARY ASTRONOMY, ACCOMPANIED BY MAPS. Since 1846 he had been lecturing, and had been engaging in the preparation of works on astronomy. In 1853 he would prepare HIGH-SCHOOL ASTRONOMY. In 1854 he would prepare SPIRIT-RAPPING UNVEILED. In 1856/1857 he would be pastor of churches in Adams and Syracuse, New York, and would be taking active part in antislavery agitation. In 1859 he would prepare SACRED MELODIES and IMPENDING CRISIS. In 1866 he would prepare IMMORTALITY OF THE SOUL, RESURRECTION OF THE BODY, and DEFENCE OF AMERICAN METHODISM. In 1867 he would prepare POPULAR AMUSEMENTS. He would die in Jersey City, New Jersey on November 24, 1868. Refer to the Reverend Nicholas Vansant's WORK HERE, AND REST HEREAFTER, A LIFE OF REVEREND HIRAM MATTISON (New York, 1870).



ASTRONOMY

ASTRONOMY



February 15: Blood and pieces of liver, brains, and flesh fell from a red cloud and splattered upon an area 30 feet wide by 250 to 300 yards long in Simpson County, [North Carolina](#):

[WALDEN](#): Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness.... At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of Nature. We must be refreshed by the sight of inexhaustible vigor, vast and Titanic features, the seacoast with its wrecks, the wilderness with its living and its decaying trees, the thunder cloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.... I love to see that Nature is so rife with life that myriads can be afforded to be sacrificed and suffered to prey on one another; that tender organizations can be so serenely squashed out of existence like pulp, – tadpoles which herons gobble up, and tortoises and toads run over in the road; and that sometimes it has rained flesh and blood!

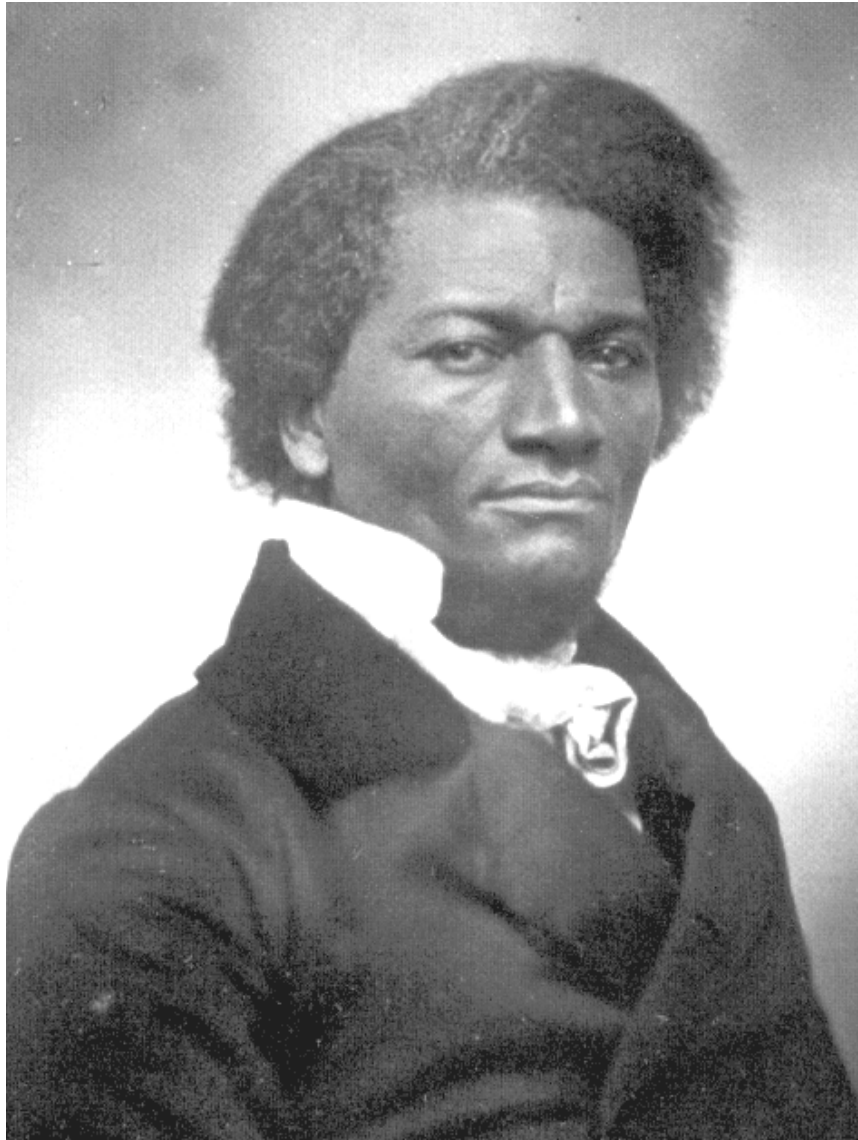
RAINS OF BLOOD, &C.

I'm sure it was by the sheerest coincidence that it was this day of the bloody rain that [Daniel Webster](#) chose to write to Dr. William Henry Furness, in justification of his attitude toward the peculiar institution of human enslavement, an aspect of the human social and political system over which unfortunately he had "no power." No, Mr. Webster was going to continue to obey Jesus Christ and pay due attention to the Sermon on the Mount — and consign black Americans to the tender mercies of their white masters:

I do what I can to restrain it, to prevent its spread and diffusion. But I cannot disregard those oracles which instruct me not to do evil that good may come; I cannot coöperate in breaking up social and political systems on the warmth (rather than the strength) of a hope that in such convulsion the cause of emancipation may be promoted. And even if the end could justify the means, I confess, my dear sir, that, in my judgment, confusion, conflict, embittered controversy, violence, bloodshed, and civil war would only rivet the chains of slavery the more strongly.

Ah, Black Daniel, almost doth thou persuade us!

At this point there was some sort of discord between [William Cooper Nell](#) and Frederick Douglass. He left Douglass's gazette North Star, although he would not completely sever relations with Douglass until 1853.



A letter from Thomas Paul Smith appeared in William Lloyd Garrison's The Liberator, that was critical of the

racial integration project being sponsored by [William Cooper Nell](#) at the [Smith School](#) in [Boston](#).

THE SMITH SCHOOL

MR. EDITOR,—DEAR SIR,—In perusing the last number of the Liberator, I was exceedingly amused by a strain of characteristic allusions and a certain resolution in a communication signed by one W. C. N. ; and that fairness may prevail, you will, I know, allow me a word in defence of those who have not favored the abolition of colored schools in Boston. It is most untrue and unphilosophical, that we should oppose the abolition of colored schools in order to degrade ourselves or our prosperity. We are colored men, exposed alike to oppression and prejudice ; our interests are all identical—we rise or fall together. We believe colored schools to be institutions, when properly conducted, of great advantage to the colored people. We believe society imperatively requires their existence among us. Many of us having children ourselves, for their sakes we are opposed to any measure which would interrupt or retard their elevation. Believing ourselves to be right, and our policy judicious, we laugh at slander, scorn opposition, and rejoice in the approval of our consciences and judgments. It is worthy of remark, however, that while those individuals who profess to desire the abolition of the colored schools claim such an immense majority, they could show on their mass petition only 227 names, according to their own count, even including children as young as three years—and that out of a population of 1950 ! And furthermore, a petition of 170, at least, was presented against them, including several of our clergymen. To be brief, as the subject has been quite fully discussed elsewhere.



ASTRONOMY

ASTRONOMY

We feel from experience (not hearsay) that education among our people requires the existence of schools among us; that from no other source can we obtain so much practical good; and, appreciating the sentiment that 'knowledge is power,' ay, and liberty and equality too, we feel determined, as we regard the intellectual above the physical, mind above matter, principle above friends, to maintain our positions while we know them to be right, for ever true, for ever faithful, and slander may talk itself tired, opposition rage and riot to exhaustion; still we will fearlessly announce the truth, 'amid the wreck of matter and the crash of worlds.'

Yours, with the highest respect,
THOMAS PAUL SMITH.

May 11, Saturday: The *Roscius* came to dock in New-York, bringing [Robert Collyer](#) and Ann Longbottom Collyer as emigrants from Yorkshire.

Discovery of a 11th [asteroid](#). (From this point forward, one or more would be being discovered each year.)

ASTRONOMY

An issue of Chambers' Edinburgh Journal:

CHAMBERS' EDINBURGH JOURNAL

ISSUE OF MAY 11



ASTRONOMY

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Good Friday: At about 4PM a small cloud discharged, over Mr. Charles H. Clarke, a “gentleman of intelligence and established credibility,” and several of the slaves of Dr. G.W. Bassett on the Farmington estate, on the south bank of the Pamunkey River in the lower end of Hanover County, Virginia, “over a surface of something less than a rood of ground, various pieces of flesh and liver, too well defined in each sort to allow any mistake in their character.” The next morning Dr. Bassett and a Mr. Brown would gather from that spot a sample consisting of some 15 or 20 pieces amounting to 4 to 6 ounces, one piece of which weighed nearly an ounce:

WALDEN: Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness.... At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of Nature. We must be refreshed by the sight of inexhaustible vigor, vast and Titanic features, the seacoast with its wrecks, the wilderness with its living and its decaying trees, the thunder cloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.... I love to see that Nature is so rife with life that myriads can be afforded to be sacrificed and suffered to prey on one another; that tender organizations can be so serenely squashed out of existence like pulp, – tadpoles which herons gobble up, and tortoises and toads run over in the road; and that sometimes it has rained flesh and blood!

RAINS OF BLOOD, &C.

June 16, Sunday night: From the observatory notebook of [Harvard College](#): “Daguerreotyped α Lyrae.”¹¹⁶ This first photograph of a star (other, of course, than Sol) required an open shutter for 100 seconds, and the primary problem which had had to be solved by these clockmakers-turned-unpaid-astronomers, [William Cranch Bond](#) and his assistant/son [George Phillips Bond](#), had been the problem of creating a mechanism sufficiently precise and smooth to keep the 38-cm [telescope](#) exactly tracking that bright star for the required exposure.¹¹⁷

HARVARD OBSERVATORY
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116. A professional Daguerreotypist named Whipple had attached a daguerrotype plate to the eyepiece of the 38-cm telescope.

117. Another source alleges that the significant event occurred on July 16th and that it was the star Vega which was first placed on record in this new manner.

September: [Jenny Lind](#) was given a private pretty-girl tour of the [Harvard Observatory](#) and was lucky enough to glimpse a “fireball.”



SKY EVENT

1851

The firm of [Thomas Cook](#) offered many British “tour-ists” the opportunity of economically visiting London to view the exhibits of progress at the Crystal Palace.



Cook has made travel easy and a pleasure.

THE GRAND TOUR

The ancestry of our present-day picture windows is closely linked to the development of window glass itself. London’s Crystal Palace –the quintessential glass structure of the Industrial Revolution– not only enclosed a world’s fair in glass, but also exhibited the largest sheet of plate glass created to that point. Until the 1920s, plate glass used for oversized [glass windows](#) would be produced entirely by the casting method. Workers would pour molten glass onto cast-iron tables from large regenerative pots, then roll, anneal, grind, and polish the slab into a finished sheet. The process was slow and labor-intensive, so plate glass was expensive. Not surprisingly, it would see very limited residential use during the 19th Century. According to Warren Scoville’s REVOLUTION IN GLASS MAKING, only “Some of the wealthiest people in Boston had begun to use polished plate glass instead of sheet glass in their front windows before 1850.” By 1870, plate glass sheets as large as 84"x60" would become possible, but the domestic output would be less than one percent. The American production of plate glass would rise steadily to 82 percent by 1890. In 1897 the Marsh Plate Glass Company of Floreffe, Pennsylvania would develop a continuous oven (lehr) for annealing plate glass, reducing the carefully controlled cooling time from three days to three hours. Stylistically, oversized windows known as “cottage” or “front” windows would grow in popularity during the 1890s. Such cottage or front windows invariably featured a transom above them, and including this transom were rarely larger than 48"x68". Cultural changes in the early 20th century, as well as innovations such as central heating, would lead to flowing, open floor plans and ever-larger home windows. The horizontal emphasis of Prairie School architecture, championed by Frank Lloyd Wright, would create a need for wide windows rather than tall ones. While Wright used decorative ribbon windows or art glass in most of his Prairie School houses, more vernacular and eclectic versions incorporated oversized windows of plate glass. To meet this market, sash-and-blind companies could simply place their cottage windows on their sides in the window frames. The transom became a casement or double-hung sash paired with a mate for natural ventilation. These new oversized windows, mimicking commercial “Chicago” windows, would for a period be known as “landscape” sash. The center sash would still rarely be larger than 48" square, but the overall window assembly would come to have a predominately horizontal axis, spanning 8' or more. Thanks to Henry Ford, by 1922 engineers had developed a semi-continuous method of rolling plate glass for automobile windshields that was soon adopted by Pittsburgh Plate Glass Co. and Libby-Owens-Ford Glass Co. As a result, the price of plate glass would plummet in comparison



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to the price of standard window glass, and though it remained the costlier material, more affordable plate glass contributed to the growing popularity of picture windows. By the 1930s, plate glass 127"x286" could be produced up to 1 1/4" thick. American Window Glass Co. of Pittsburgh offered a plate glass alternative for oversized windows dubbed "Crystal Sheet," a special 39-ounce-per-square-foot) glass 3/16" in thickness. Nevertheless, picture windows were usually glazed with 1/4", 5/16", or 3/8" plate glass, while larger windows required thicker glass for stability. Chicago's Century of Progress International Exposition of 1933 would unveil George Fred Keck's ultra-modern House of Tomorrow and Crystal House emphasizing the use of glass throughout the home. The term "picture window" would be coined a few years later. A solar-home innovator, George Fred Keck would introduce thermal pane windows in 1935, but thermal pane picture windows would not be commonly found on all classes of residential work until the 1960s.

February 27, Thursday (to March 3): Henry Thoreau would be surveying, during this period, for Cyrus Stow, a Pine Hill woodlot in the east part of Concord, in the rear of Joseph Merriam's house off Old Bedford Road.

(The invoice for this work has been preserved in the Thoreau Collection at Middlebury College.)

View [Henry Thoreau](#)'s personal working drafts of his surveys courtesy of AT&T and the Concord Free Public Library:

http://www.concordlibrary.org/scollect/Thoreau_Surveys/Thoreau_Surveys.htm

(The official copy of this survey of course had become the property of the person or persons who had hired this Concord town surveyor to do their surveying work during the 19th Century. Such materials have yet to be recovered.)

View this particular personal working draft of a survey in fine detail:

http://www.concordlibrary.org/scollect/Thoreau_Surveys/137.htm



February 27, Thursday: Saw today on Pine Hill behind Mr. Joseph Merriam's House a Norway pine. The first I have seen in Concord— Mr Gleason pointed it out to me as a singular pine which he did not know the name of. It was a very handsome tree about 25 feet high. E Wood thinks that he has lost the surface of 2 acres of his meadow by the ice.— Got 15 cartloads out of a hummock left on another meadow

Blue joint was introduced into the first meadow where it did not grow before.

Of two men, one of whom knows nothing about a subject, and what is extremely rare, knows that he knows nothing—and the other really knows something about it, but thinks that he knows all— What great advantage has the latter over the former? Which is the best to deal with?

I do not know that knowledge amounts to anything more definite than a novel & grand surprise on a sudden revelation of the insufficiency of all that we had called knowledge before. An indefinite sense of the grandeur & glory of the Universe. It is the lighting up of the mist by the sun

But man cannot be said to know in any higher sense, than he can look serenely & with impunity in the face of the sun.

A culture which imports much muck from the meadows & deepens the soil—not that which trusts to heating manures & improved agricultural implements only.

How when a man purchases a thing he is determined to get & get hold of it using how many expletives & how long a string of synonymous or similar terms signifying possession—in the legal process— What's mine's my own. An old Deed of a small piece of swamp land which I have lately surveyed at the risk of being mired past recovery says "that the said Spaulding his Heirs & Assigns, shall and may from time, & at all times forever hereafter, by force & virtue of these presents, lawfully, peaceably and quietly have, hold, use, occupy, possess and enjoy the said swamp &c"

Magnetic iron being anciently found in *Magnesia* hence—magnes or magnet employed by Pliny & others—

Chinese appear to have discovered the magnet very early A D 121 & before? used by them to steer ships in 419—mentioned by an Icelander 1068—in a French poem 1181 In Torfaeus Hist of Norway 1266—used by DeGama in 1427 leading stone hence load stone

The peroxide of hydrogen or ozone at first thought to be a chemical curiosity merely is found to be very generally diffused through nature.

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PLINY



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The following bears on the floating ice which has risen from the bottom of the meadows— Robert Hunt says “Water conducts heat downward but very slowly; a mass of ice will remain undissolved but a few inches under water, on the surface of which, ether, or any other inflammable body, is burning. If ice swam beneath the surface, the summer sun would scarcely have power to thaw it; and thus our lakes & seas would be gradually converted into solid masses”¹¹⁸

The figures of serpents of griffins flying dragons and other embellishments of heraldry—the eastern idea of the world on an elephant that on a tortoise & that on a serpent again &c usually regarded as mythological in the com. sense of that word—are thought by Hunt? to “indicate a faint & shadowy knowledge of a previous state of organic existence”—such as geology partly reveals.

The fossil tortoise has been found in Asia large enough to support an elephant.

Ammonites, snake-stones, or petrified snakes have been found from of old—often decapitated.

In the N part of Gt Britain the fossil remains of encrinites are called “St. Cuthbert’s beads.”—“fiction dependant on truth.”

Westward is Heaven or rather heavenward is the west. The way to heaven is from east to west around the earth The sun leads & shows it The stars too light it.

Nature & man Some prefer the one others the other; but that is all dè gustibus— It makes no odds at what well you drink, provided it be a well-head.

Walking in the woods it may be some afternoon the shadow of the wings of a thought flits across the landscape of my mind And I am reminded how little eventful is our lives What have been all these wars & survivors of wars and modern discoveries & improvements so called a mere irritation in the skin. But this shadow which is so soon past & whose substance is not detected suggests that there are events of importance whose interval is to us a true historic period.

The lecturer is wont to describe the 19th century—the American the last generation in an offhand & triumphant strain—wafting him to Paradise spreading his fame by steam & telegraph—recounting the number of wooden stopples he has whittled But who does not perceive that this is not a sincere or pertinent account of any man’s or nation’s life. It is the hip hip hurrah & mutual admiration society style. Cars go by & we know their substance as well as their shadow. They stop & we get into them. But those sublime thoughts passing on high do not stop & we never get into them. Their conductor is not like one of us.

I feel that the man who in his conversation with me about the life of man in New England lays much stress on rail-roads telegraphs & such enterprises does not go below the surface of things— He treats the shallow & transitory as if it were profound & enduring in one of the minds avatars in the intervals between sleeping & waking—aye even in one of the interstices of a Hindoo dynasty perchance such things as the 19th century with all its improvements may come & go again. Nothing makes a deep & lasting impression but what is weighty Obey the law which reveals and not the law revealed.

I wish my neighbors were wilder.

A wildness whose glance no civilization could endure.

He who lives according to the highest law—is in one sense lawless That is an unfortunate discovery certainly that of a law which binds us where we did not know that we were bound. Live free—child of the mist. He who for whom the law is made who does not obey the law but whom the law obeys—reclines on pillows of down and is wafted at will whither he pleases—for man is superior to all laws both of heaven & earth. (when he takes his liberty.)

Wild as if we lived on the marrow of antelopes devourd raw

There would seem to be men in whose lives there have been no events of importance more than in the beetles which crawls in our path.

ARTIST OF KOUROO

One of the things we can become aware of from the above is that Henry Thoreau is still processing the information in the materials he checked out last December from Stacy’s Circulating Library in Concord, [Roualeyn George Gordon-Cumming](#)’s account of FIVE YEARS OF A HUNTER’S LIFE IN THE FAR INTERIOR OF SOUTH AFRICA. WITH NOTICES OF THE NATIVE TRIBES, AND ANECDOTES OF THE CHASE OF THE LION, ELEPHANT, HIPPOPOTAMUS, GIRAFFE, RHINOCEROS, &C. (New York: Harper & brothers).

FIVE YEARS IN AFRICA, I

FIVE YEARS IN AFRICA, II

118. Wouldn’t Henry Thoreau have been fascinated to learn that Walden Pond originated as a mass of buried, slowly melting ice left behind by glaciation?

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March 12-14: [Harvard Observatory](#) Daguerretyped “a better representation of the Lunar surface than any engraving.”

ASTRONOMY

March 22: Father [Isaac Hecker](#), C.SS.R. wrote to [Orestes Augustus Brownson](#), Esq.

At the [Harvard Observatory](#), [George Phillips Bond](#) succeeded in making a series of Daguerreotype exposures of Jupiter which seemed to him to include a faint suggestion of the planet’s belts as visible by the eye directly through the telescope lens. The planet seemed, despite its great distance, to be of approximately the same brightness as the moon — an early indication of a difference in albedo among the various heavenly bodies.

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June 2: [Henry David Thoreau](#) went to Boston and conversed with [John Downes](#), who was connected with the Coast Survey and was printing tables for Astronomical Geodesic & other uses. Downes would have been visiting Boston at the time, not living there. “He tells me that he once saw the common sucker in numbers piling up stones as big as his fist. (like the piles which I have seen) taking them up or moving them with their mouths.”

On his way, Thoreau stopped by Cambridge to check out, from [Harvard Library](#), François André Michaux’s *VOYAGE À L’OUEST DES MONTS ALLÉGHANYS DANS LES ÉTATS DE L’OHIO, DU KENTUCKY ET DU TENNESSÉE, ET RETOUR A CHARLESTON* (1804).

“There is no Frigate like a Book
To take us Lands away”
— Emily Dickinson



July 7, Monday: [Henry Thoreau](#) went with Sexton Anthony Wright to view the universe through Perez Blood's [telescope](#). Just for the fun of it, I will illustrate this with a depiction, prepared in this very year by H. Dassel, which is not of Thoreau peering through Blood's telescope but of the astronomer [Maria Mitchell](#), peering presumably through her father's telescope on the roof of his bank at the comet she had discovered (**see following screen**).



July 7, Monday: The intimations of the night are divine methinks. men might meet in the morning & report the news of the night.— What divine suggestions have been made to them I find that I carry with me into the day often some such hint derived from the gods Such impulses to purity—to heroism—to literary effort even as are never day-born.

One of those morning's which usher in no day—but rather an endless morning—a protracted auroral season—for clouds prolong the twilight the livelong day—

And now that there is an interregnum in the blossoming of the flowers so is there in the singing of the birds—

The golden robin is rarely heard —& the bobolink &c.

I rejoice when in a dream I have loved virtue & nobleness.

Where is Grecian History? It is when in the morning I recall the intimations of the night.

The moon is now more than half full.¹¹⁹ When I come through the village at 10 o'clock this cold night—cold as in May—the heavy shadows of the elms covering the ground with their rich tracery impress me as if men had got so much more than they had bargained for—not only trees to stand in the air, but to check the ground with their shadows— At night they lie along the earth. They tower—they arch—they droop over the streets like chandeliers of darkness. In my walk the other afternoon I saw the sun shining into the depths of a thick pine wood, checkering the ground like moonlight—and illuminating the lichen-covered bark of a large white-pine, from which it was reflected Through the surrounding thicket as from another sun—; This was so deep in the woods that you would have said no sun could penetrate thither.

I have been tonight with Anthony Wright to look through Perez Bloods Telescope a 2nd time.¹²⁰ A dozen of **his** Bloods neighbors were swept along in the stream of our curiosity. One who lived half a mile this side said that Blood had been down that way within a day or two with his terrestrial or day glass looking into the eastern horizon the hills of Billerica Burlington—and Woburn— I was amused to see what sort of respect this man with a telescope had obtained from his neighbors—something akin to that which savages award to civilized men— though in this case the interval between the parties was very slight. Mr Blood with his scull cap on his short figure—his north European figure made me think of Tycho Brahe— He did not invite us into his house this cool evening—men nor women— Nor did he ever before to my knowledge

I am still contented to see the stars with my naked eye Mr Wright asked him what his instrument cost He answered —“Well, that is something I dont like to tell. (stuttering or hesitating in his speech a little, as usual) It is a very proper question however” — “Yes,” said I, “and you think that you have given a very proper answer.”

Returning my companion Wright the sexton told me how dusty he found it digging a grave that afternoon for one who had been a pupil of mine—for two feet he said, notwithstanding the rain, he found the soil as dry as ashes.

With a certain wariness, but not without a slight shudder at the danger oftentimes, I perceive how near I had come to admitting into my mind the details of some trivial affair, as a case at court— And I am astonished to observe how willing men are to lumber their minds with such rubbish—to permit idle rumors tales incidents even of an insignificant kind—to intrude upon what should be the sacred ground of the thoughts Shall the temple of our thought be a public arena where the most trivial affair of the market & the gossip of the teatable is discussed—a dusty noisy trivial place—or shall it be a quarter of heaven itself—a place consecrated to the service of the gods—a hypaethral temple. I find it so difficult to dispose of the few facts which to me are significant that I hesitate to burden my mind with the most insignificant which only a divine mind could illustrate. Such is for the most part the news—in newspapers & conversation. It is important to preserve the mind's chastity in this respect Think of admitting the details of a single case at the criminal court into the mind—to stalk profanely through its very sanctum sanctorum for an hour—aye for many hours—to make a very bar-room of your mind's inmost apartment—as if for a moment the dust of the street had occupied you—aye the very street itself with all its travel passed through your very mind of minds—your thoughts shrine—with all its filth & bustle [possibly “hustle”]— Would it not be an intellectual suicide? By all manner of boards & traps threatening the extreme penalty of the divine law excluding trespassers from these grounds it behoves us to preserve the purity & sanctity of the mind. It is so hard to forget what it is worse than useless to remember. If I am to be a channel or thorough [thoroughfare]—I prefer that it be of the mountain springs —& not the town sewers— The Parnassian streams There is inspiration—the divine gossip which comes to the ear of the attentive mind—from the Courts of Heaven—there is the profane & stale revelation of the barroom & the police Court.

119. The moon would have been half full on the 4th.

120. I don't know when the first time was.

TYCHO BRAHE



The same ear is fitted to receive both communications—only the character of the individual determines to which source chiefly it shall be open & to which closed. I believe that the mind can be profaned by the habit of attending to trivial things so that all our thoughts shall be tinged with triviality. They shall be dusty as stones in the street— Our very minds shall be paved and macadamized as it were—its foundation broken into fragments for the wheels of travel to roll over. If we have thus desecrated ourselves the remedy will be by circumspection—& wariness by our aspiration & devotion to consecrate ourselves—to make a fane of the mind. I think that we should treat ourselves as innocent & ingenuous [ingenuous] children whose guardians we are—be careful what objects & what subjects we thrust on its attention¹²¹

Even the facts of science may dust the mind by their dryness—unless they are in a sense effaced each morning or rather rendered fertile by the dews of fresh & living truth. Every thought that passes through the mind helps to wear & tear it & to deepen the ruts which as in the streets of Pompeii evince how much it has been used. How many things there are concerning which we might well deliberate whether we had better know them. Routine—conventionalities manners &c &c—how insensibly and undue attention to these dissipates & impoverishes the mind—robs it of its simplicity & strength emasculates it. Knowledge doe[s] not cone [come] to us by details but by lieferungs from the gods. What else is it to wash & purify ourselves? Conventionalities are as bad as impurities. Only thought which is expressed by the mind in repose as it wer[e] lying on its back & contemplating the heaven's—is adequately & fully expressed— What are side long—transient passing half views? The writer expressing his thought—must be as well seated as the astronomer contemplating the heavens—he must not occupy a constrained position. The facts the experience we are well poised upon—! Which secures our whole attention!¹²²

The senses of children are unprofaned their whole body is one sense—they take a physical pleasure in riding on

121. [Henry Thoreau](#) would use some of the material from this day in regard to his “we should live in eternity rather than in time” theme, in his early lecture “WHAT SHALL IT PROFIT”:

[Paragraph 81] If we have thus desecrated ourselves,—as who has not?—the remedy will be by wariness and circumspection, by devotion and aspiration to reconsecrate ourselves—and make once more a fane of the mind. We should treat our minds—that is, ourselves—as innocent and ingenuous children, whose guardians we are, and be careful what objects and what subjects we thrust on their attention. Read not the Times.¹ Read the Eternities.² Even the facts of science may dust the mind by their dryness, unless they are in a sense effaced each morning, or rather rendered fertile by the dews of fresh and living truth. Knowledge does not come to us by details, but in flashes of light from heaven. Yes, every thought that passes through the mind helps to wear and tear it, and to deepen the ruts, which, as in the streets of Pompeii, evince how much it has been used. How many things there are concerning which we might well deliberate whether we had better know them—had better let their peddling carts be driven even at the slowest trot or walk—over that bridge of glorious span by which we trust to pass at last from the furthest brink of time to the nearest shore of eternity. Conventionalities are as bad as impurities. By an undue attention to routine, manners, and so forth,³ the mind is insensibly dissipated and impoverished—robbed of its simplicity and strength and, in short, emasculated.

1.[“The Times” was presumably the London [Times](#).]

2.I [Bradley P. Dean] emend the essay copy-text by omitting ‘Conventionalities are at length as bad as impurities.’, which appears after this sentence in the essay but which appears without the words ‘at length’ as the penultimate sentence of this paragraph in the extant reading-draft manuscript.

3.I [Bradley P. Dean] emend the manuscript copy-text by expanding ‘&c’ to ‘and so forth’.

The poet W.H. Auden has in 1962 brought forward a snippet from this day’s entry as:

THE VIKING BOOK OF APHORISMS, A PERSONAL SELECTION BY W.H. AUDEN...

Pg	Topic	Aphorism Selected by Auden out of Thoreau
353	Reason and Thought	We should treat our minds as innocent and ingenious children whose guardians we are — be careful what objects and what subjects we thrust on their attention.



a rail –they love to teter –so does the unviolated –the unsophisticated mind derive an inexpressable pleasure from the simplest exercise of thoughts.

I can express adequately only the thought which I *love* to express.– All the faculties in repose but the one you are using –the whole energy concentrated in that.

Be ever so little distracted –your thoughts so little confused– Your engagements so few –your attention so free your existence so mundane –that in all places & in all hours you can hear the sound of crickets in those seasons when they are to be heard. It is a mark of serenity & health of mind when a person hears this sound much –in streets of cities as well as in fields. Some ears never hear this sound –are called deaf. Is it not because they have so long attended to other sounds?

122. [Thoreau](#) would later use this comment pertaining to his “different drummer” theme, in his early lecture “WHAT SHALL IT PROFIT”:

[Paragraph 79] Not without a slight shudder at the danger, I often perceive how near I had come to admitting into my mind the details of some trivial affair,—the news of the street; and I am astonished to observe how willing men are to lumber their minds with such rubbish,—to permit idle rumors and incidents of the most insignificant kind to intrude on ground which should be sacred to thought. Shall the mind be a public arena, where the affairs of the street and the gossip of the tea-table chiefly are discussed? Or shall it be a quarter of heaven itself,—an hypæthral temple, consecrated to the service of the gods?¹ I find it so difficult to dispose of the few facts which to me are significant, that I hesitate to burden my attention with those which are insignificant, which only a divine mind could illustrate. Such is, for the most part, the news in newspapers and conversations. It is important to preserve the mind’s chastity in this respect. Think of admitting the details of a single case of the criminal court into our thoughts, to stalk profanely through their very *sanctum sanctorum* for an hour, ay, for many hours! to make a very bar-room of the mind’s inmost apartment, as if for so long the dust of the street had occupied us,—the very street itself, with all its travel, its bustle, and filth had passed through our thoughts’ shrine! Would it not be an intellectual and moral suicide?

[Paragraph 80] By all kinds of traps and sign-boards, threatening the extreme penalty of the divine law, exclude such trespassers from the only ground which can be sacred to you. It is so hard to forget what it is worse than useless to remember! If I am to be a thoroughfare, I prefer that it be of the mountain-brooks, the Parnassian streams, and not the town-sewers. There is inspiration, that gossip which comes to the ear of the attentive mind from the courts of heaven. There is the profane and stale revelation of the bar-room and the police court. The same ear is fitted to receive both communications. Only the character of the hearer determines to which it shall be open, and to which closed. I believe that the mind can be permanently profaned by the habit of attending to trivial things, so that all our thoughts shall be tinged with triviality. Our very intellect shall be macadamized, as it were,—its foundation broken into fragments for the wheels of travel to roll over; and if you would know what will make the most durable pavement, surpassing rolled stones—spruce blocks—and asphaltum—you have only to look into some of our minds which have been subjected to this treatment so long.

1. Compare I Corinthians 3:16.

DIFFERENT
DRUMMER

July 9, Wednesday: [Henry Thoreau](#) visited [Harvard Observatory](#) on Concord Avenue in Cambridge. Perhaps this had been suggested by [John Downes](#), who earlier in the year had been in touch with the observatory about the occultation of stars. It has been presumed that it was the director, [William Cranch Bond](#), age about 62, who showed Thoreau around and answered his questions. I suggest that it would more likely have been his son the assistant observer [George Phillips Bond](#), six years out of [Harvard College](#), who would have been providing



such a public relations service, and that the director would have been reserving himself for occasional visitors who thought they had cachet and who might be more easily offended, such as [Prince Albert](#). My reasons for suspecting this are that I can't believe the astronomers would have taken Thoreau seriously, plus George was more of Henry's own age group, plus George is known to have had an abiding interest in nature and in particular in ornithology.¹²³

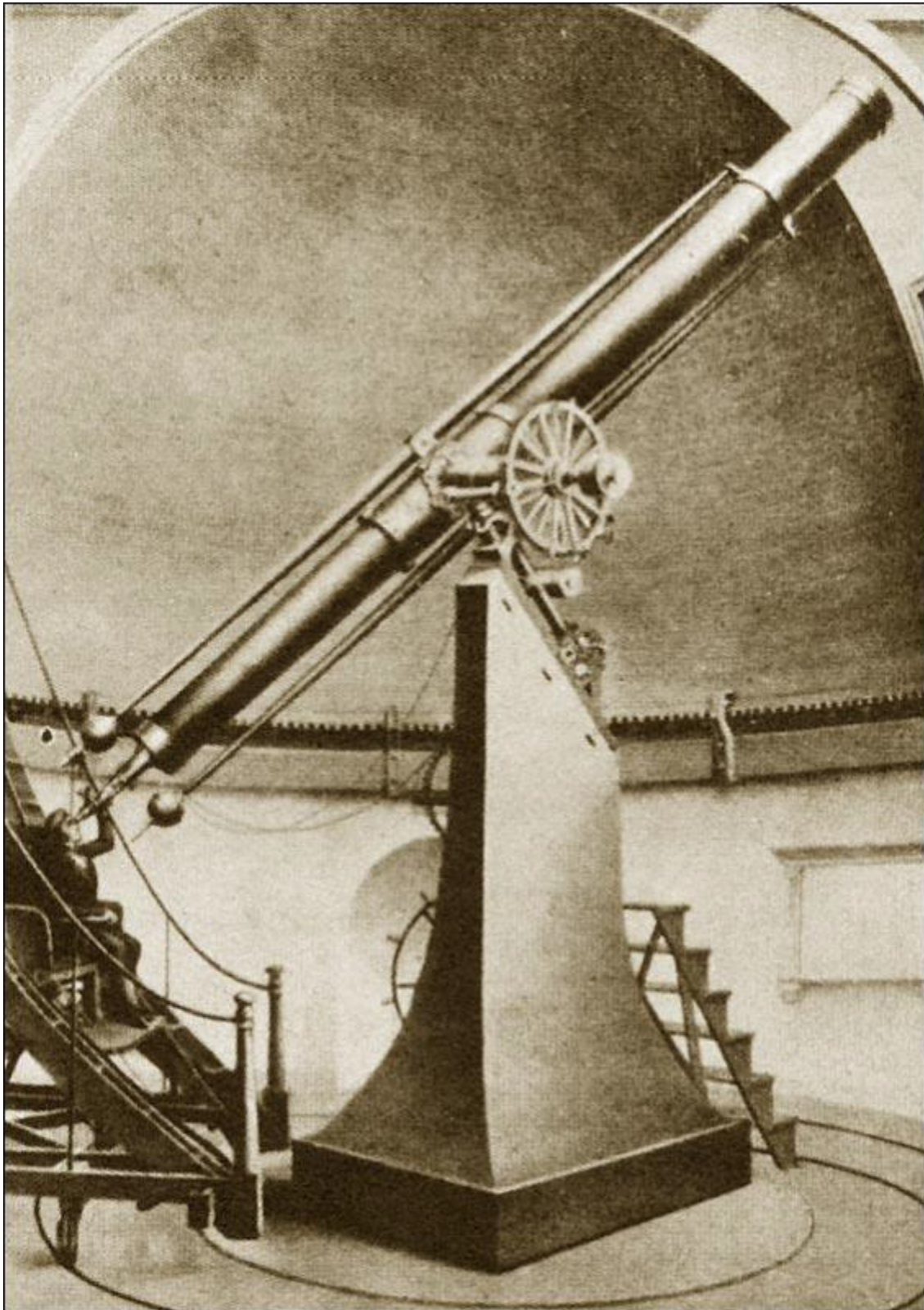
ASTRONOMY

Thoreau stopped by the [Boston Society of Natural History](#) and checked out Volume I of the MEMOIRS OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES, new series.

123. A case in point is the treatment awarded by historians of the science of astronomy to [Henry Thoreau](#)'s visit in the official study on the first four directorships of the Harvard College observatory, by Bessie (Judith) Zaban Jones and Lyle Gifford Boyd, entitled THE HARVARD COLLEGE OBSERVATORY: THE FIRST FOUR DIRECTORSHIPS, 1839-1919 (Cambridge MA: The Belknap Press of Harvard UP, 1971). This is a meticulous book, quite elaborately documented. Yet I note that in dealing with Thoreau's visit, they have deviated from their standard practice: they have

- 1.) quoted from his [JOURNAL](#) without scholarly apparatus of footnotes and citations, they have
- 2.) quoted incorrectly, and they have
- 3.) tried to make a mere joke of his visit, by an aside the point of which seems to be that this guy Thoreau was so far out in left field, who else would come up with the sort of comment he could come up with, whatever his comment might mean if anybody ever tried to take such a person seriously.

In fact, Thoreau's visit was quite serious, and bore directly upon the struggle the current director was having as a volunteer "gentleman" researcher with the likes of Professors [Louis Agassiz](#) and [Benjamin Peirce](#), and all the other ideologs of scientific bureaucracy whose primary objective then as now was not discovery itself, but rather their seizure of control over all processes of discovery. I suppose I am saying that since we cannot expect serious people to take Thoreau seriously today, we can have no reason to assume that serious people would take Thoreau seriously in his own day — certainly not to the extent of extending VIP treatment to **someone who was not acting in any manner as VIPs should act!**





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ASTRONOMY

Harriet Beecher Stowe wrote to Frederick Douglass while serializing *UNCLE TOM'S CABIN*, asking him for contacts for information about slave life on cotton plantations. In this letter she took issue with his opposition to colonization and with his criticisms of Christianity:

You may perhaps have noticed in your editorial readings a series of articles that I am furnishing for the Era under the title of "Uncle Tom's Cabin or Life among the Lowly" - In the course of my story, the scene will fall upon a cotton plantation - I am very desirous to gain information from one who has been an actual labourer on one - & it occurs to me that in the circle of your acquaintance there might be one who would be able to communicate to me some such information as I desire - I have before me an able paper written by a southern planter in which the details & modus operandi are given from his point of sight - I am anxious to have some more from another standpoint - I wish to be able to make a picture that shall be graphic & true to nature in its details - Such a person as Henry Bibb, if in this country might give me just the kind of information I desire you may possibly [sic] know of some other person - I will subjoin to this letter a list of questions which in that case, you will do me a favor by enclosing to the individual - with a request that he will at earliest convenience answer them -

- I have noticed with regret, your sentiments on two subjects, - the church - & African Colonization - & with the more regret, because I think you have a considerable share of reason for your feelings on both these subjects - but I would willingly if I could modify your views on both points.

After all my brother, the strength & hope of your oppressed race does lie in the church - In hearts united to Him ... Every thing is against you - but Jesus Christ is for you - & He has not forgotten his church misguided & erring though it be.... This movement must & will become a purely religious one ... christians north & south will give up all connection with [slavery] & later up their testimony against it - & thus the work will be done -



July 9, Wednesday: When I got out of the cars at Porter's Cambridge this morning -I was pleased to see the handsome blue flowers of the Succory or Endive Cichorium intybus -which reminded me that within the hour I had been whirled into a new botanical region. They must be extremely rare, if they occur at all in Concord. This weed is handsomer than most garden flowers. Saw there also the Cucubalus behen or Bladder Campion. also The Autumnal dandelion Apargia Autumnalis.

Visited the Observatory. Bond said they were cataloguing the stars at Washington? or trying to. They do not at Cambridge of no use with their force. Have not force enough now to make mag. obs. When I asked if an observer with the small telescope could find employment -he said "O yes -there was employment enough for observation with the naked eye -observing the changes in the brilliancy of stars &c &c -if they could only get some good observers.- One is glad to hear that the naked eye still retains some importance in the estimation of astronomers.

Coming out of town -willingly as usual -when I saw that reach of Charles River just above the Depot -the fair still water this cloudy evening suggesting the way to eternal peace & beauty -whence it flows -the placid lake-like fresh water so unlike the salt brine -affected me not a little- I was reminded of the way in which Wordsworth so coldly speaks of some natural visions or scenes "giving him pleasure". This is perhaps the first vision of elysium on this rout from Boston.

And just then I saw an encampment of Penobscots -their wigwams appearing above the rail road fence -they too looking up the river as they sat on the ground & enjoying the scene. What can be more impressive than to look up a noble river just at evening -one perchance which you have never explored -& behold its placid waters reflecting the woods -& sky lapsing inaudibly toward the ocean -to behold as a lake -but know it as a river -tempting the beholder to explore it -& his own destiny at once. haunt of waterfowl -- this was above the

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factories –all that I saw That water could never have flowed under a factory –how *then* could it have reflected the sky?

WALDEN: Consider first how slight a shelter is absolutely necessary. I have seen Penobscot Indians, in this town, living in tents of thin cotton cloth, while the snow was nearly a foot deep around them, and I thought that they would be glad to have it deeper to keep out the wind. Formerly, when how to get my living honestly, with freedom left for my proper pursuits, was a question which vexed me even more than it does now, for unfortunately I am become somewhat callous, I used to see a large box by the railroad, six feet long by three wide, in which the laborers locked up their tools at night, and it suggested to me that every man who was hard pushed might get such a one for a dollar, and, having bored a few auger holes in it, to admit the air at least, get into it when it rained and at night, and hook down the lid, and so have freedom in his love, and in his soul be free. This did not appear the worst, nor by any means a despicable alternative. You could sit up as late as you pleased, and, whenever you got up, go abroad without any landlord or house-lord dogging you for rent. Many a man is harassed to death to pay the rent of a larger and more luxurious box who would not have frozen to death in such a box as this. I am far from jesting. Economy is a subject which admits of being treated with levity, but it cannot so be disposed of.



ASTRONOMY

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July 24, Thursday: There had been a shower of blood with pieces of flesh over an area of ground 30 yards wide and 300 yards long, at an Army station in Benicia, California. The pieces of flesh ranged from the size of a pigeon's egg to the size of a small orange. The shower lasted some two to three minutes and was reported in the San Francisco Herald of this date:

WALDEN: Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness.... At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of Nature. We must be refreshed by the sight of inexhaustible vigor, vast and Titanic features, the seacoast with its wrecks, the wilderness with its living and its decaying trees, the thunder cloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.... I love to see that Nature is so rife with life that myriads can be afforded to be sacrificed and suffered to prey on one another; that tender organizations can be so serenely squashed out of existence like pulp, – tadpoles which herons gobble up, and tortoises and toads run over in the road; and that sometimes it has rained flesh and blood!

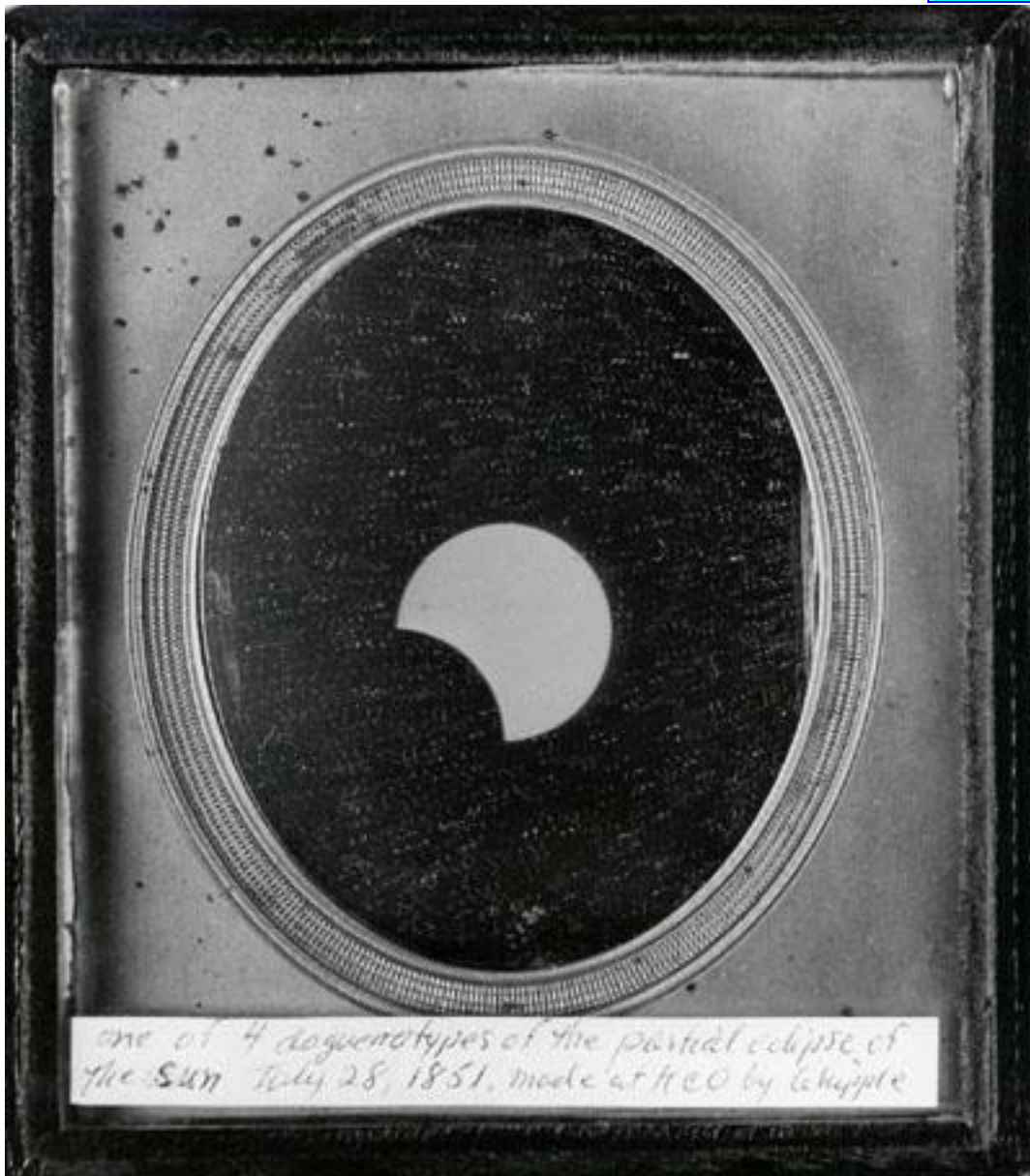
RAINS OF BLOOD, &C.

ASTRONOMY

ASTRONOMY

July 28, Monday: [Harvard Observatory](#) managed to make a series of four Daguerreotypes of the succeeding phases of a total eclipse of the sun (#7292) which passed from west to east across upper Canada but was, from their off-path viewpoint in Cambridge, Massachusetts, viewable and photographable only as if it had been a mere partial eclipse.

PHOTOGRAPHY



This eclipse, however, continued on and was also total along its path over Königsberg, Prussia, where Berkowski was able also to expose Daguerreograph plates, and on down to Persia — it would be Berkowski who would obtain credit for the 1st Daguerreotype of a total eclipse.



July 28, Monday: morn

Sailed the Gurnet. which runs down seven miles into the bay from Marshfield. Heard the *peep* of the *beach bird* —saw some ring-necks in company with peeps. They told of eagles [Bald Eagle ■ *Haliaeetus*

Leucocephalus] which had flown low over the island lately— went by Saquish.— Gathered a basket full of Irish-moss bleached on the beach. Saw a field full of pink-blossomed potatoes at the light house —remarkably luxuriant & full of blossoms —also some French barley. Old fort & barracks by light house. Visited lobster houses or huts there where they use lobsters to catch bait for lobsters. Saw on the shanties signs from ships as “Justice Story” & “Margueritta”. To obtain bait is sometimes the main thing.— Samphire [*Salicornia*] which they pickle —also a kind of prickly samphire which I suppose is Salt-wort or *Salsola Caroliniana*. Well at C. Island [Clark’s Island] 27 ³/₄ ft deep. Cut the rock weed on the rocks at low tide once in 2 or 3 years —very valuable more than they have time to save.

Uncle Ned told of a man who went off fishing from back of Welfleet in calm weather & with great difficulty got ashore through the surf. Those in the other boat who had landed were unwilling to take the responsibility of telling them when to pull for shore —the one who had the helm was inexperienced. They were swamped at once— So treacherous is this shore —before the wind comes perchance the sea may run so as to upset & drown you on the shore. At first they thought to pull for Provincetown but night was coming on & that was distant many a long mile. Their case was a desperate one —when they came near the shore & saw the terrific breakers that intervened they were deterred. They were thoroughly frightened.

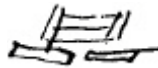
Were troubled with skunks on this Island —they must have come over on the ice. Foxes they had seen —had killed one woodchuck —even a large *mud-turtle* —which they *conjectured some bird must have dropped* muskrats they had seen & killed 2 raccoons once. I went a clamming just before night. this the clam-digger—



“UNCLE NED” WATSON

“UNCLE BILL” WATSON

Borrowed of uncle Bill (Watson) in his schooner home The clams nearly a foot deep —but I broke many in digging said not to be good now —but we found them good eaten fresh. No sale for them now —fetch 25 cts a bucket in their season. Barry caught squids as bait for bass. We found many dead clams —the shells full of sand —called sand clams— By a new clam law any one can dig clams here. Brown’s Island so called —a shoal off the Gurnet thought to have been an isle once —a dangerous place. Saw here fences the posts set in cross sleepers made to be removed in winter.



The finest music in a menagerie its wildest strains have something in them akin to the cries of the tigers & leopards around in their native forests— Those strains are not unfitted to the assemblage of wild beasts— They express to my ear what the Tigers stripes & the leopards spots express to my eye —& the they appear to grin with satisfaction at the sound. That nature has any place at all for music is very good.

August 8, Friday: [Nathaniel Hawthorne](#) visited the Shakers at Hancock near Lenox,¹²⁴ was politely shown around by an elder, and decided that his pleasant old host's society was



hateful and disgusting to think of; and the sooner the sect is extinct the better – a consummation which, I am happy to hear, is thought to be not a great many years distant.

MOTHER ANN LEE AND THE “SHAKERS”

To give you an idea of the sort of thing Hawthorne had encountered, and to which he had had such a strong reaction, here is a description of a Shaker group as of 1829 (you can be sure they didn't much vary from group

124. At the time, the Shakers or “The United Society of Believers in Christ's Second Appearing” of New Hampshire were involved in some sort of legal issue, and their attorney at court was Hawthorne's college sidekick [Franklin Pierce](#). The Shakers were followers of an exceptionally practical 18th-Century religious mystic they called Mother Ann Lee, whose motto for them was “Hands to Work and Hearts to God.” They were celibate and lived apart from the world. This Society of Believers had numbered some 300 in Hancock, in 1829, although there were only 3 left by 1960 when the village was put up for sale.



The Hancock Shaker Village, phone (413) 443-0188, is five miles out US 20 west of Pittsfield. From May until October 31, the village is open from 9:30AM to 5:00PM, and the cafe in the Visitor's Center is also open for lunch and snacks. Guided 90-minute tours are also available in April and November from 10:00AM to 3:00PM. Admission is \$9.⁰⁰, and family admission, for two adults and all children under 18, is \$25.⁰⁰. They charge \$4.⁵⁰ for children 6 to 12. Occasionally, for \$35.⁰⁰, they offer an evening tour with candlelight supper. Elizabeth Linzey, an interpreter at the white-framed meeting house with white and Prussian blue interior, tells modern tourists the Shakers believed that “perfect was simply the best you could do. So everyone could do something perfect. That's why they tried so hard and did so well.”

to group, and that they hadn't much changed from 1829 to 1851):

The Elders wear long plain coats and wide brimmed hats, but the Sunday costume of the ordinary man consists of pantaloons of blue linen with a fine white stripe in it, vest of a much deeper blue linsey-woolsey, stout calfskin shoes and grey stockings. Their shirts are made of cotton, the collars fastened with three buttons and turned over. The women wear, on Sunday, some a pure white dress, and others a white dress with a delicate blue stripe in it. Over their necks and bosoms were pure white kerchiefs, and over the left arm of each was carried a large white pocket handkerchief. Their heads were covered with lawn caps, the form of all, for both old and young, being alike. They project so as to fully conceal the cheeks in profile. Their shoes, sharp-toed and high-heeled, according to the fashion of the day when the Society was formed [1747], were made of prunella of a brilliant ultramarine blue. And there were children too, with cheerful faces peering out from their broad hats and deep bonnets, for they were all dressed like old men and women. I marvelled at the sight of children in that isolated world of bachelors and maidens, forgetting that it was a refuge for orphans who are unsheltered in the stormy world without.

And here is a poet imagining the horrific reaction which non-Shakers had to what they witnessed on their tours

of sites such as the Shaker community at Harvard, Massachusetts:

THE WORLD SEES

We have spied through the windows of The Square House at Harvard, where groans, shrieks, loud yellings, incredible laughters, singing and stamping feet – all have lately vibrated the timbers of that house, and of adjoining ones.

What we have seen! A bedlam of chanting, yelling, trembling! Some Shakers jerking their heads and limbs uncontrollably for upwards of twenty minutes, other threshing around wildly on the floor whilst others ramble around them, oblivious.

Some lie as dead (who knows for how long – it's rumored for hours). Some are beasts and go on all fours like maddened dogs, or whelps, barking, howling, and snapping at others in like dismal states of mind. We have noticed, strongly, that the men seldom mingle with the women, the latter engendering hysteria and beast-madness, in their own parts of the building. It is unlikely, therefore, that they are, as rumored, licentious and libidinous.

But, of this we are certain: we are dismayed, as God-fearing citizens, to have such madness in our midst. Certainly their rheums, catarrhs, and effluvia let loose upon Harvard will propel the rest of us to early graves. We shall deal with these folks as we must, to silence them.*

*Robert Peters. SHAKER LIGHT: MOTHER ANN LEE IN AMERICA. Greensboro: Unicorn Press, 1987, page 121.



August 8, Friday: 7^{1/2} PM To Conantum– The moon has not yet quite filled her horns–¹²⁵ I perceive why we so often remark a dark cloud in the west at and after sunset– It is because it is almost directly between us and the sun & hence we see the dark side and moreover it is much darker than it other-wise would be because of the little light reflected from the earth at that hour. The same cloud at mid day & over head might not attract attention. There is a pure amber sky beneath the present bank –thus framed off from the rest of the heavens – which with the outlines of small dead elms seen against it –I hardly know far or near –make picture enough. Men will travel far to see less interesting sights than this. Turning away from the sun we get this enchanting view as when a man looks at the landscape with inverted head. Under shadow of the dark cloud which I have described the cricket begins his strain –his ubiquitous strain. Is there a fall-cricket distinct from the species we hear in spring & summer?

I smell the cornfield over the brook a dozen rods off –& it reminds me of the green corn feasts of the Indians. The evening train comes rolling in –but none of the passengers jumping out in such haste attend to the beautiful fresh picture which nature has unrolled in the west –& surmounted with that dark frame. The circular platter of the carrots blossom is now perfect.

Might not this be called the invalide's moon on account of the warmth of the nights? The principal employments of the farmers now seems to be getting their meadow hay. & cradling some oats &c.

The light from the western sky is stronger still than that of the moon –and when I hold up my hand the west side is lighted while the side toward the moon is comparatively dark.– – But now that I have put this dark wood (Hubbards's) between me and the west –I see the moon light plainly on my paper– I am even startled by it– One star too, is it Venus?, I see in the west Starlight –! that would be a good way to mark the hour if we were precise. Hubbards brook– How much the beauty of the moon is enhanced by being seen shining between two trees –or even by the neighborhood of clouds! I hear the clock striking eight faintly. I smell the late shorn

125. It was half full on the night of the 3rd and would be full on the night of the 10th.

meadows

One will lose no music by not attending the oratorios & operas. The really inspiring melodies are cheap & universal –& are as audible to the poor man's son as to the rich mans. Listening to the harmonies of the universe is not allied to dissipation. My neighbors have gone to the vestry to hear "Ned Kendal" the bugler tonight, but I am come forth to the hills to hear my bugler in the horizon– I can forego the seeming advantages of cities without misgiving. No heavenly strain is lost to the ear that is fitted to hear it for want of money – or opportunity. I am convinced that for instrumental music All Vienna cannot serve me more than the Italian boy who seeks my door with his organ.

And now I strike the road at the causeway– It is hard & I hear the sound of my steps a sound which should never be heard –for it draws down my thoughts. It is more like the treadmill exercise. The fireflies are not so numerous as they have been. There is no dew as yet. The planks & railing of Hubbards bridge are removed. I walk over on the string pieces resting in the middle until the moon comes out of a cloud that I may see my path –for between the next piers the string pieces also are removed & there is only a rather narrow plank – let down 3 or 4 feet.– I essay to cross it –but it springs a little & I mistrust myself –whether I shall not plunge into the river. Some demonic genius seems to be warning me. Attempt not the passage –you will surely be drowned– It is very real that I am thus affected– Yet I am fully aware of the absurdity of minding such suggestions– I put out my foot but I am checked as if that power had laid a hand on my breast & chilled me back –never the less I cross –stooping at first –& gain the other side.– (I make the most of it –on account of the admonition –but it was nothing to remark on– I returned the same way 2 hours later & made nothing of it) It is easy to see how by yielding to such feelings as this men would recreate all reestablish all the superstitions of antiquity. It is best that reason should govern us and not these blind intimations –in which we exalt our fears into a genius.


DIFFERENT DRUMMER

On Conantum I sit awhile in the shade of the woods & look out on the moonlit fields– White rocks are more remarkable than by day.

The air is warmer than the rocks now. It is perfectly warm & I am tempted to stay out all night & observe each phenomenon of the night until day dawns. But if I should do so, I should not wonder if the town were raised to hunt me up. Sitting on the door step of Conant-house –at 9 o clock I hear a pear drop –how few of all the apples that fall do we hear fall.

I could lie out here on this pinnacle rock all night without cold– I hear a horse **sneeze**? from time to time in his pasture– He sees me & knows me to be a man –though I do not see him.

To lie here on your back with nothing between your eye & the stars –nothing but space –they your nearest neighbors on that side –be they strange or be they tame –be they other worlds or merely ornaments to this–

Who could ever go to sleep under these circumstances. I hear the 9 o clock bell ringing in Bedford – an unexpectedly musical sound that of a bell in the horizon always is– Pleasantly sounds the voice of one village to another. It is sweet as it is rare. Since I sat here a bright star has gone behind the stem of a tree –proving that my machine is moving– I hear a solitary whipporwill [Whip-Poor-Will  *Caprimulgus Vociferus*] –& a bull frog on the river fewer sounds than in spring. The grey cliffs across the river are plain to be seen– And now the star appears on the other side of the tree –& I must go– Still no dew up here I see 3 scythes hanging on an apple tree– There is the wild apple tree where hangs the forgotten scythe.– the rock where the shoe was left.

The woods & the separate trees cast longer shadows than by day –for the moon goes lower in her course at this season. Some dew at last in the meadow. As I recross the string pieces of the bridge –I see the water bugs swimming briskly in the moonlight. I scent the Roman Wormwood in the Potatoe fields.

August 12, Tuesday: [Isaac Merritt Singer](#) of New-York was granted a patent for his home [sewing](#) machine. This would be duly reported upon in a forthcoming issue of the weekly magazine [Scientific American](#). Later on Singer would buy out [Elias Howe](#).




August 12, Tuesday: 1^{1/2} AM. Full moon¹²⁶ Arose and went to the river and bathed, stepping very carefully not to disturb the household and still carefully in the street not to disturb the neighbors. I did not walk naturally & freely till I had got over the wall. Then to Hubbards bridge at 2 AM– There was a whipporwill

126. Actually the moon had been full on the night of the 10th.

ASTRONOMY




ASTRONOMY


[Whip-Poor-Will  *Caprimulgus Vociferus*] in the road just beyond Godwins which flew up & lighted on the fence & kept alighting on the fence within a rod of me & circling round me with a slight squeak as if inquisitive about me. I do not remember what I observed or thought in coming hither. The traveller's whole employment is to calculate what cloud will obscure the moon and what she will triumph over— In the after midnight hours the traveller's sole companion is the moon— All his thoughts are centered in her. She is waging continual war with the clouds in his behalf. What cloud will enter the lists with her next this employs his thoughts—and when she enters on a clear field of great extent in the heavens & shines unobstructedly he is glad. And when she has fought her way through all the squadrons of her foes —& rides majestic in a clear sky —he cheerfully & confidently pursues his way —& rejoices in his heart. But if he sees that she has many new clouds to contend with he pursues his way moodily as one disappointed & aggrieved —he resents it as an injury to himself. It is his employment to watch the moon the companion & guide of his journey wading through clouds —and calculate what one is destined to shut out her cheering light.

He traces her course now almost completely obscured —through the ranks of her foes and calculates where she will issue from them. He is disappointed & saddened when he sees that she has many clouds to contend with. Sitting on the sleepers of Hubbards bridge which is being repaired now 3 o'clock AM I hear a cock crow. How admirably adapted to the dawn is that sound.— as if made by the first rays of light rending the darkness —the creaking of the sun's axle heard already over the eastern hills.

Though man's life is trivial & handselled nature is holy & heroic. With what infinite faith & promise & moderation begins each new day. It is only a little after 3 o'clock and already there is evidence of morning in the sky. He rejoices when the moon comes forth from the squadrons of the clouds unscathed and there are no more any obstructions in her path. And the cricket also seems to express joy in his song. It does not concern men who are asleep in their beds, but it is very important to the traveller whether the moon shines bright & unobstructed or is obscured by clouds. It is not easy to realize the serene joy of all the earth when the moon commences to shine unobstructedly unless you have often been a traveller by night.

The traveller also resents it if the wind rises & rustles the leaves—or ripples the water and increases the coolness at such an hour. A solitary horse in his pasture was scared by the sudden sight of me an apparition to him standing still in the moonlight & moved about inspecting with alarm—but I spoke & he heard the sound of my voice, he was at once reassured & expressed his pleasure by wagging his stump of a tail. though still half a dozen rods off— How wholesom the taste of huckleberries, when now by moon light I feel for them amid the bushes.

And now the first signs of morning attract the traveller's attention, and he cannot help rejoicing, and the moon begins gradually to fade from his recollection. The wind rises & rustles the copses (The sand is cool on the surface but warm 2 or 3 inches beneath & the rocks are quite warm to the hand, so that he sits on them or leans against them for warmth though indeed it is not cold elsewhere) As I walk along the side of Fair Haven Hill I see a ripple on the river —& now the moon has gone behind a large & black mass of clouds, and I realize that I may not see her again in her glory this night—that perchance ere she rises from this obscurity the sun will have risen, & she will appear but as a cloud herself —& sink unnoticed into the west (being a little after full (a day?)) As yet no sounds of awakening men—only the more frequent crowing of cocks still standing on their perches in the barns. The milkmen are the earliest risers, though I see no lanthorn's carried to their barns in the distance—preparing to carry the milk of cows in their tin cans for men's breakfasts even for those who dwell in distant cities. In the twilight now by the light of the stars alone, the moon being concealed they are pressing the bounteous streams from full udders into their milk pails & the sound of the streaming milk is all that breaks the sacred stillness of the dawn—distributing their milk to such as have no cows. I perceive no mosquitoes now are they vespertinal like the singing of the whippoorwill [Whip-Poor-Will  *Caprimulgus Vociferus*]. I see the light of the obscured moon reflected from the river brightly—with what mild emphasis nature marks the spot—so bright & serene a sheen that does not more contrast with the night. 4 AM. It adds a charm—a dignity, a glory—to the earth to see the light of the moon reflected from her streams. There are but us three the moon—the earth which wears this jewel (the moon's reflection) in her crown —& myself. Now there has come round the cliffs (on which I sit) all unobserved & mingled with the dusky sky of night—a lighter—and more ethereal living blue—whispering of the sun still far far away behind the horizon— From the summit of our atmosphere perchance he may already be seen by soaring spirits that inhabit those thin upper regions & they communicate the glorious intelligence to us lower ones. (Not without sadness and compassion I reflect that I shall not see the moon again in her glory.) The real **divine** the heavenly blue—the Jove containing air it is I see through this dusky lower stratum. The sun gilding the summits of the air. The arteries of light flow over all the sky. (Not far from four still in the night I heard a night-hawk [Common Nighthawk  *Chordeiles minor*] squeak & boom high in the air—as I sat on the cliff— What is said about this being less of a night bird than the whippoorwill [Whip-Poor-Will  *Caprimulgus Vociferus*] is perhaps to be questioned. For neither do I remember to have heard the whippoorwill sing at 12 o'clock—though I met one sitting & flying between 2 & 3 this morning— I believe that both may be heard at midnight—though very rarely.)

Now at **very earliest** dawn the night hawk booms & the whippoorwill [Whip-Poor-Will  *Caprimulgus Vociferus*] sings. Returning down the hill by the path to where the woods cut off I see the signs of the day—the morning red— There is the lurid morning star soon to be blotted out by a cloud



There is an early redness in the east which I was not prepared for changing to amber or saffron –with clouds beneath in the horizon and also above this clear streak–

The birds utter a few languid & yawning notes as if they had not left their perches –so sensible to light to wake so soon– A faint peeping sound from I know not what kind –a slight innocent half awake sound –like the sounds which a quiet house wife makes in the earliest dawn. I hear a wood-thrush [*Hylocichla mustelina*] even now long before sunrise as in the heat of the day. & the peewee [*Eastern Phoebe* *Sayornis phoebe*] & the catbird [*Gray Catbird* *Dumetella carolinensis*] –& the vireo –redeyed [*Vireo olivaceus*]? I do not hear –or do not mind perchance the crickets now. Now whippoorwills [*Whip-Poor-Will* *Caprimulgus Vociferus*] commence to sing in earnest considerably **after** the wood thrush [*Hylocichla mustelina*] – The wood-thrush that beautiful singer inviting the day once more to enter his pine woods. (So you may hear the woodthrush & whippoorwill at the same time.) Now go by two whippoorwills in haste seeking some coverts from the eye day. And the bats are flying about on the edge of the wood improving the last moments of their day –in catching insects. The moon appears at length –not yet as a cloud –but with a frozen light ominous of her fate. The early cars sound like a wind in the woods– The chewinks [*Rufous-Sided Towhee* *Pipilo Erythrophthalmus*] make a business now of waking each other up with their low “yorrick” in the neighboring low copse The sun would have shown before but for the cloud. Now on his rising not the clear sky but –the –cheeks of the clouds high & wide are tinged with red which like the sky before turns gradually to saffron –& then to the white light of day.

The nettle leaved vervain *Verbena Urticifolia* by road side at Emerson’s. What we have called hemp answers best to *urtica dioica* large stinging nettle? Now the great sunflower’s golden disk is seen

The days for some time have been sensibly shorter –there is time for music in the evening

I see polygonums in blossom by road side –white & red.
A *Eupatorium* from Hubbard bridge causeway –answers to *E. Purpureum* –except in these doubtful points that the former has 4 leaves in a whorl –is unequally serrate, the stem is **nearly** filled with a thin pith –the corymb is not merely terminal –florrets 8 & 9.

Differs from *verticillatum* –in the stem being not solid –and I perceive no diff – bet calyx & corolla in color if I know what the two are.

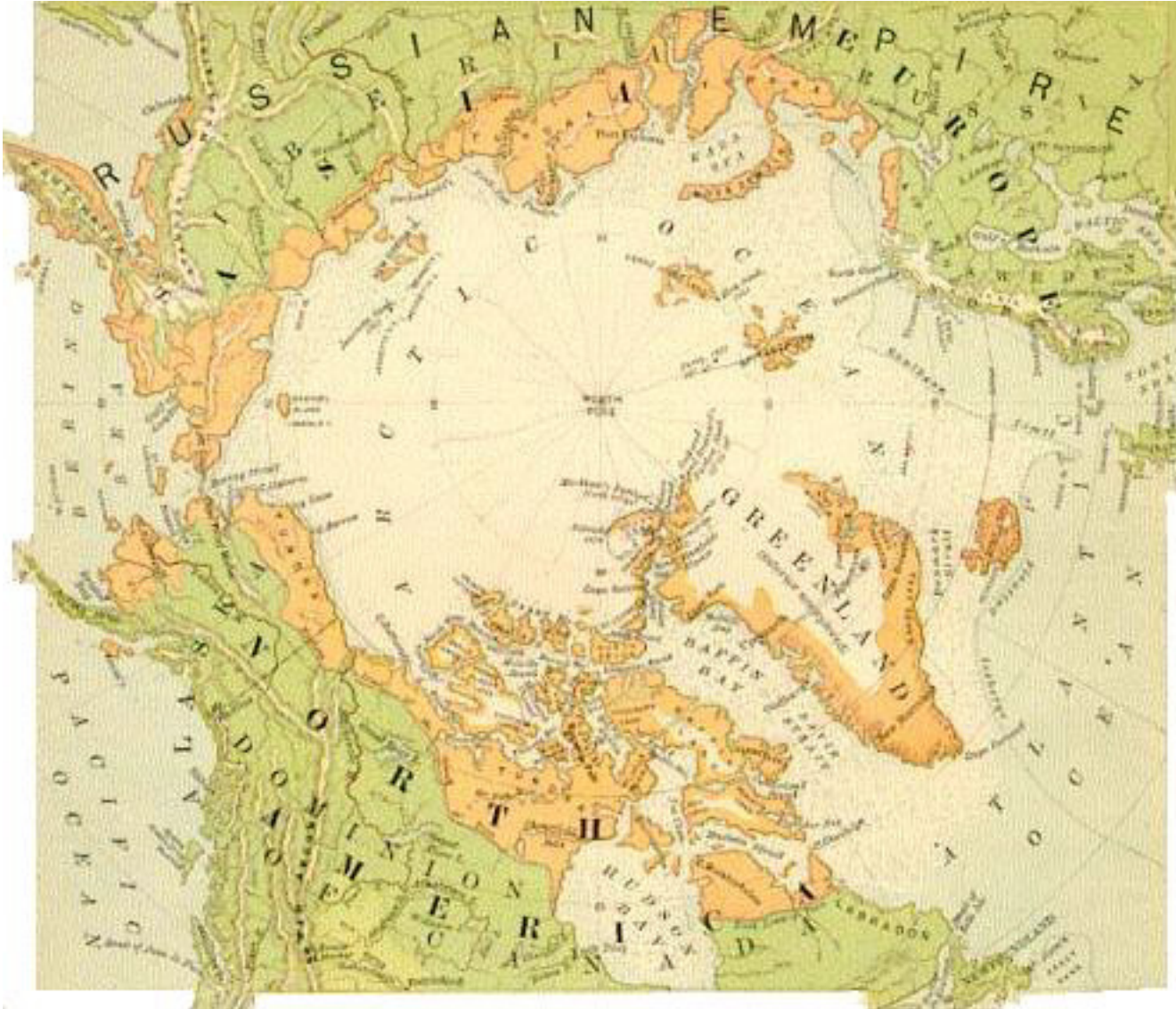
It may be one of the intermediate varieties referred to.

September 7, Sunday: At this point [Henry Thoreau](#) originated what eventually would become, after four distinct revisions during Fall 1854 during preparations for the lecture he would deliver on December 4, 1854 at Railroad Hall in [Providence](#), a leaf now in the Houghton Library. Just prior to his death Thoreau submitted a revised version of this lecture to James Fields for print publication as an essay, including this leaf which he had not included in the lecture as it had been delivered in [Rhode Island](#), and the essay would be published as his “LIFE WITHOUT PRINCIPLE”. Here is the final version as it would posthumously be published:

It seems to me that there is nothing memorable written upon the art of life – at least in these days. By what discipline to secure the most life? I would like to know how to spend this evening; not how to economize time, but how to spend it – that the day may not have been in vain. It is plain that men are not well employed. We explore the coast of Greenland but leave our own interior blank. I would fain go to that place or condition where my life is to be found. I suffer that to be rumor which may be verified. We are surrounded by mystery; as big a drapery [sic] which adapts itself to all our motives, and yet most men will be reminded by this of no garment but their shirts and pretend perchance that the only mystery left is the magnetic character of the North Pole. That is the great problem nowadays. To devote your life to the discovery of the divinity in Nature, or to the eating of oysters! I have read how many car-loads of oysters are sent daily from Connecticut to western New York. So it seems that some men are devoted even to the mere statistics of the oyster business, who perhaps do not get any oysters!

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Now, here is the original initial first version of this finished product, as it appeared as of this date:



September 7, Sunday: We sometimes experience a mere fulness of life, which does not find any channels to flow into. We are stimulated but to no obvious purpose. I feel myself uncommonly prepared for **some** literary work, but I can select no work. I am prepared not so much for contemplation, as for forceful expression. I am braced both physically and intellectually. It is not so much the music – as the marching to the music that I feel.

I feel that the juices of the fruits which I have eaten the melons & apples have ascended to my brain–& are stimulating it. They give me a heady force. Now I can write nervously. Carlyle’s writing is for the most part of this character.

[Miss Martineau](#)’s last book is not so bad as the timidity which fears its influence.¹²⁷ As if the popularity of this or that book would be so fatal–& man would not still be man in the world. Nothing is so much to be feared as

127. [Thoreau](#) was presumably referring to the correspondence of the notorious free-thinker [Harriet Martineau](#) with her friend Henry Atkinson, which was being published during this year by J. Chapman of London as *LETTERS ON THE LAWS OF MAN’S NATURE AND DEVELOPMENT*. Martineau shocked many readers with her acceptance of her friend’s “necessarianism, materialism [and] perfectibilism.”



fear— Atheism may be popular with God himself.

What shall we say of these timid folk who carry the principle of thinking nothing & doing nothing and being nothing to such an extreme— As if in the absence of thought that vast yearning of their natures for something to fill the vacuum— made the least traditionary expression & shadow of a thought to be clung to with instinctive tenacity. They atone for their producing nothing by a brutish respect for something. They are as simple as oxen and as guiltless of thought & reflection.— their reflections are reflected from other minds. The creature of institutions—bigoted— & a conservatist— can say nothing hearty. he cannot meet life with life— but only with words. He rebuts you by avoiding you. He is shocked like a woman. Our extatic states which appear to yield so little fruit, have this value at least— though in the seasons when our genius reigns we may be powerless for expression.— Yet in calmer seasons, when our talent is active, the memory of those rarer moods comes to color our picture & is the permanent paint pot as it were into which we dip our brush

Thus no life or experience goes unreported at last— but if it be not solid gold it is gold-leaf which gilds the furniture of the mind. It is an experience of infinite beauty— on which we unfailingly draw. Which enables us to exaggerate ever truly. Our moments of inspiration are not lost though we have no particular poems to show for them. For those experiences have left an indelible impression, and we are ever and anon reminded of them. Their truth subsides & in cooler moments we can use them as paint to gild & adorn our prose. When I despair to sing them I will remember that they will furnish me with paint with which to adorn & preserve the works of talent one day. They are like a pot of pure ether.

They lend the writer when the moment comes a certain superfluity of wealth— making his expression to overrun & float itself. It is the difference between our river now parched & dried up exposing its unsightly & weedy bottom—& the same when in the spring it covers all the meads with a chain of placid lakes, reflecting the forests & the skies.

We are receiving our portion of the Infinite. The **Art of life!** Was there ever anything memorable written upon it? By what disciplines to secure the most life— with what care to watch our thoughts. To observe not what transpires, in the street— but in the mind. & heart of me! I do not remember any page which will tell me how to spend this afternoon. I do not so much wish to know how to economize time—as how to spend it—by what means to grow rich. That the day may not have— been in vain.

What if one moon has come & gone with its world of poetry—its weird teachings—its oracular suggestions— So divine a creature— freighted with hints for me, and I not use her. One moon gone by unnoticed!!

Suppose you attend to the hints to the suggestions which the moon makes for one month—commonly in vain—will they not be very different from any thing in literature or religion or philosophy. The scenery, when it is truly seen reacts on the life of the seer. How to live— How to get the most life! as if you were to teach the young hunter how to entrap his game. How to extract its honey from the flower of the world. That is my every day business. I am as busy as a bee about it. I ramble over all fields on that errand and am never so happy as when I feel myself heavy with honey & wax. I am like a bee searching the livelong day for the sweets of nature. Do I not impregnate & intermix the flowers produce rare & finer varieties by transferring my eyes from one to another? I do as naturally & as joyfully with my own humming music— seek honey all the day. With what honied thought any experience yields me I take a bee line to my cell. It is with flowers I would deal. Where is the flower there is the honey— which is perchance the nectareous portion of the fruit— there is to be the fruit— & no doubt flowers are thus colored & painted— to attract & guide the bee. So by the dawning or radiance of beauty are we advertised where is the honey & the fruit of thought of discourse & of action— We are first attracted by the beauty of the flower, before we discover the honey which is a foretaste of the future fruit. Did not the young Achilles (?) spend his youth learning how to hunt? The art of spending a day. If it is possible that we may be addressed— it behoves us to be attentive. If by watching all day & all night— I may detect some trace of the Ineffable— then will it not be worth the while to watch? Watch & pray without ceasing— but not necessary in sadness— be of good cheer. Those Jews were too sad: to another people a still deeper revelation may suggest only joy. Dont I know what gladness is? Is it but the reflex of sadness, its back side? In the Hebrew gladness I hear but too distinctly still the sound of sadness retreating. Give me a gladness which has never given place to



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sadness.



I am convinced that men are not well employed – that this is not the way to spend a day. If by patience, if by watching I can secure one new ray of light – can feel myself elevated for an instant upon Pisgah – the world which was dead prose to me become living & divine – shall I not watch ever – shall I not be a watchman henceforth?– If by watching a whole year on the city's walls I may obtain a communication from heaven, shall I not do well to shut up my shop & turn a watchman? Can a youth – a man – do more wisely – than to go where his life is to be found? As if I had suffered that to be rumor – which may be verified. We are surrounded by a rich & fertile mystery– May we not probe it – pry into it – employ ourselves about it – a little? To devote your life to the discovery of the divinity in Nature or to the eating of oysters would they not be attended with very different results?¹²⁸

I cannot **easily** buy a blank book to write thoughts in, they are all ruled for dollars & cents.¹²⁹

If the wine which will nourish me grows on the surface of the moon – I will do the best I can to go to the moon for it.

The discoveries which we make abroad are special and particular – those which we make at home are general & significant. The further off the nearer the surface. The nearer home the deeper. Go in search of the springs of life – & you will get exercise enough. Think of a man's swinging dumb bells for his health – when those springs are bubbling in far off pastures unsought by him! The seeming necessity of swinging dumbbells proves that he

128. This entry would inspire [Thoreau](#) as he began to write “WHAT SHALL IT PROFIT” in late 1854:

The art of life! Was there ever anything memorable written upon it? By what disciplines to secure the most life, with what care to watch our thoughts. To observe what transpires, not in the street, but in the mind and heart of me! I do not remember any page which will tell me how to spend this afternoon. I do not so much wish to know how to economize time as how to spend it, by what means to grow rich, that the day may not have been in vain.... How to live. How to get the most life.... How to extract its honey from the flower of the world. That is my everyday business. I am as busy as a bee about it.... The art of spending a day. If it is possible that we may be addressed, it behooves us to be attentive.... I am convinced that men are not well employed, that this is not the way to spend a day.... We are surrounded by a rich and fertile mystery. May we not probe it, pry into it, employ ourselves about it, a little? To devote your life to the discovery of the divinity in nature or to the eating of oysters, would they not be attended with very different results?



has lost his way.

To watch for describe all the divine features which I detect in Nature.

My profession is to be always on the alert to find God in nature – to know his lurking places. To attend all the oratorios – the operas in nature.

The mind may perchance be persuaded to act –to energize – by the action and energy of the body. Any kind of liquid will fetch the pump.

We all have our states of fullness & of emptiness – but we overflow at different points. One overflows through the sensual outlets – another through his heart another through his head–& another perchance only through the higher part of his head or his poetic faculty– It depends on where each is tight & open. We can perchance thus direct our nutriment to those organs we specially use.

How happens it that there are few men so well employed–, so much to their minds, but that a little money –or fame – would by them off from their present pursuits!¹³⁰

7th still: To Conantum via fields Hubbards Grove & grain field To Tupelo cliff & Conantum and turning over peak same way. 6. P M I hear no larks [Eastern Meadowlark] [Sturnella magna] sing at evening as in the spring – nor robins. only a few distressed notes from the robin– In Hubbards grain field beyond the brook – now the the sun is down. The air is very still– There is a fine sound of crickets not loud The woods & single trees are heavier masses in the landscape than in the spring. Night has more allies. The heavy shadows of woods and trees are remarkable now. The meadows are green with their second crop. I hear only a tree toad or song sparrow [Melospiza] [melodia] singing as in spring at long intervals. The Roman wormwood is beginning to yellow-green my shoes.– intermingled with the blue-curls over the sand in this grain field. Perchance some poet likened this yellow dust to the ambrosia of the Gods. The birds are remarkably silent At the bridge perceive the bats are out. & the yet silvery moon not quite full is reflected in the water. The water is perfectly still – and there is a red tinge from the evening sky in it. The sky is singularly marked this evening. There are bars or rays of nebulous light springing from the western horizon where the sun has disappeared, and alternating with beautiful blue rays, by far more blue than any other portion of the sky these continue to diverge till they have reached the middle & then converge to the eastern horizon – making a symmetrical figure like the divisions of a muskmelon – not very bright yet distinct.– though growing less & less bright toward the east. It was a quite remarkable phenomenon encompassing the heavens, as if you were to behold the divisions of a muskmelon thus alternately colored from within it.

A proper vision – a colored mist. The most beautiful thing in Nature is the sun reflected from a tear-ful cloud. These white and blue ribs embraced the earth. The two outer blues much the brightest & matching one another. You hear the hum of mosquitoes.

Going up the road. The sound of the crickets is now much more universal & loud. Now in the fields I see the white white streak of the neottia in the twilight– The whippoorwills [Whip-poor-will] [Caprimulgus vociferus] sing far off. I smell burnt land somewhere. At Tupelo Cliff I hear the sound of singers on the river young men & women – which is unusual here – returning from their row. Man's voice thus uttered fits well the spaces– It fills Nature. And after all the singing of men is something far grander than any natural sound. It is wonderful that men do not oftener sing in the fields – by day & night. I bathe at the north side the cliff while the moon shines round the end of the rock– The opposite Cliff is reflected in the water. Then sit on the S side of the Cliff in the woods. One or two fireflies – could it be a glowworm– I thought I saw one or two in the air (–that is all in this walk) I hear a whippoorwill uttering a cluck of suspicion in my rear– He is suspicious & inquisitive. The river stretches off southward from me. I see the sheeny portions of its western shore interruptedly for a quarter of a mile – where the moon light is reflected from the pads.– a strong gleaming light while the water is lost in the obscurity.

I hear the sound from time to time of a leaping fish –or a frog –or a muskrat or turtle.– It is even warmer methinks than it was in August–& it is perfectly clear the air. I know not how it is that this universal cricket's creak should sound thus regularly intermittent – as if for the most part they fell in with one another & creaked in time – making a certain pulsing sound a sort of breathing or panting of all nature. You sit twenty feet above the still river – see the sheeny pads. & the moon & some bare tree tops in the distant horizon. Those bare tree tops add greatly to the wildness.

Lower down I see the moon in the water as bright as in the heavens – only the water bugs disturb its disk –

129. Thoreau would later copy this into his early lecture “WHAT SHALL IT PROFIT”, combining it with an entry made on June 29, 1852 (JOURNAL 4:162) to form the following:

[Paragraph 6] I cannot easily buy a blank book to write thoughts in; they are all ruled for dollars and cents. If a man was tossed out of a window when an infant, and so made a cripple for life, or scared out of his wits by the Indians, it is regretted chiefly because he was thus incapacitated for—business! I think that there is nothing, not even crime, more opposed to poetry, to philosophy, ay, to life itself, than this incessant business.



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and now I catch a faint glassy glare from the whole river surface which before was simply dark. This is set in a frame of double darkness on the east i.e. the reflected shore of woods & hills & the reality – the shadow & the substance bipartite answering to each. I see the northern lights over my shoulder to remind me of the Esquimaux & that they are still my contemporaries on this globe – that they too are taking their walks on another part of the planet. – in pursuit of seals perchance.

The stars are dimly reflected in the water – The path of water-bugs in the moon's rays is like ripples of light. It is only when you stand fronting the sun or moon that you see their light reflected in the water. I hear no frogs these nights – bull-frogs or others – as in the spring – It is not the season of sound.

At Conantum end – just under the wall From this point & at this height I do not perceive any bright or yellowish light on Fair Haven – but an oily & glass like smoothness on its southwestern bay – through a very slight mistiness. Two or three pines appear to stand in the moon lit air on this side of the pond – while the Enlightened portion of the water is bounded by the heavy reflection of the wood on the east It was so soft & velvety a light as contained a thousand placid days sweetly put to rest in the bosom of the water. So looked the north Twin Lake in the Maine woods. It reminds me of placid lakes in the mid-noon of Ind. Summer days – but yet more placid & civilized – suggesting a higher cultivation – which aeons of summer days have gone to make. Like a summer day seen far away. All the effects of sunlight – with a softer tone – and all this stillness of the water & the air superadded – & the witchery of the hour. What gods are they that require so fair a vase of gleaming water to their prospect in the midst of the wild woods by night? Else why this beauty allotted to night – a gem to sparkle in the zone of night. They are strange gods now out – methinks their names are not in any mythology – I can faintly trace its zigzag border of sheeny pads even here. If such is there to be seen in remotest wildernesses – does it not suggest its own nymphs & wood Gods to enjoy it? As When at middle of the placid noon in Ind summer days all the surface of a lake is as one cobweb – gleaming in the sun which heaves gently to the passing zephyr – There was the lake – its glassy surface just distinguishable – its sheeny shore of pads – with a few pines bathed in light on its hither shore just as in mid of a november day – except that this was the chaster light of the moon – the cooler – temperature of the night and these were the deep shades of night that fenced it round & imbosomed. It tells of a far away long passed civilization of an antiquity superior to time – unappreciable by time.

Is there such virtue in raking cranberries – that those men's industry whom I now see on the meadow – shall reprove my idleness? Can I not go over those same meadows after them & rake still more valuable fruits. Can I not rake with my mind? Can I not rake a thought perchance which shall be worth a bushel of cranberries?¹³¹ A certain refinement & civilization in nature which increases with the wildness. The civilization that consists with wildness. The light that is in night. A smile as in a dream on the face of the sleeping lake. There is light enough to show what we see – what **night** has to exhibit – any more would obscure these objects. I am not advertised of any deficiency of light. The actual is fair as a vision or a dream. If ever we have attained to any nobleness – ever in our imagination & intentions – that will surely ennoble the features of nature for us that will clothe them with beauty. Of course no jeweller ever dealt with a gem so fair & suggestive as this actual lake. The scene it may be of so much noble & poetic life – & not merely adorn some monarch's crown.

It is remarkably still at this hour & season – no sound of bird or beast for the most part. This has none of the reputed noxious qualities of night.

On the Peak. The faint sounds of birds – dreaming aloud – in the night – the fresh cool air & sound of the wind

130. This would appear in "WHAT SHALL IT PROFIT" as:

[Paragraph 36] It is remarkable that there are few men so well employed, so much to their minds, but that a little money or fame would commonly buy them off from their present pursuit. I see advertisements for **active** young men, as if activity were the whole of a young man's capital. Yet I have been surprised when one has with confidence proposed to me, a grown man, to embark in some enterprise of his, as if I had absolutely nothing to do, my life having been a complete failure hitherto. What a doubtful compliment this is to pay me! As if he had met me half-way across the ocean beating up against the wind, but bound nowhere, and proposed to me to go along with him! If I did, what do you think the Underwriter¹ would say? No, no! I am not without employment at this stage of the voyage. To tell the truth, I saw an advertisement for able-bodied seamen, when I was a boy, sauntering in my native port, and as soon as I came of age I embarked.

1. Bradley P. Dean has emended the essay copy-text from 'underwriters' on authority of an intermediate lecture-draft manuscript in OCIW (see Dean, "Sound of a Flail," pages 403-404 for a transcription of this manuscript).

rushing over the rocks – remind me of the tops of mts. That is all the earth is but the outside of the planet bordering on the hard eyed skyed – equally with drawn & near to heaven. is this pasture as the summit of the white mts– All the earth’s surface like a mt top – for I see its relation to heaven as simply. & am not imposed upon by a difference of a few feet in elevation.– In this faint light all fields are like a mossy rock – & remote from the cultivated plains of day. All is equally savage – equally solitary – & the dif. in elevation is felt to be unimportant. It is all one with caucasus the slightest hill pasture.

The bass wood had a singularly solid look & sharply defined – as by a web or film – as if its leaves covered it like scales–

Scared up a whippoorwill [**Whip-poor-will** █ *Caprimulgus vociferus*] on the ground on the hill. Will not my townsmen consider me a benefactor if I conquer some realms from the night? If I can show them that there is some beauty awake while they are asleep.? If I add to the domains of poetry. If I report to the gazettes anything transpiring in our midst worthy of man’s attention. I will say nothing now to the disparagement of Day, for he is not here to defend himself.

The northern lights now as I descend from the Conantum house have become a crescent of light crowned with short shooting flames – or the shadows of flames. for some times they are dark as well as white. There is scarcely any dew even in the low lands.

Now the fire in the north increases wonderfully – not shooting up so much as creeping along like a fire on the mts of the north seen afar in the night. The Hyperborean gods are burning brush, and it spread and all the hoes in heaven could’nt stop it. It spread from west to east over the crescent hill. Like a vast fiery worm it lay across the northern sky – broken into many pieces & each piece strives to advance itself worm like on its own muscles It has spread into the choicest woodlots of valhalla – now it shoots up like a single (solitary watch fire) or) burning bush – or where it ran up a pine tree like powder – & still it continues to gleam here & there like a fat stump in the burning & is reflected in the water. And now I see the gods by great exertions have got it under, & the stars have come out without fear in peace.

Though no birds sing, the crickets vibrate their shrill & stridulous cymbals especially on the alders of the causeway. Those minstrels especially engaged for night’s quire.

It takes some time to wear off the trivial impression which the day has made – & thus the first hours of night are sometimes lost.

There were two hen hawks [**Red-tailed Hawk** █ *Buteo jamaicensis*] soared and circled for our entertainment when we were in the woods on that Boon Plain the other day – crossing each others orbits from time to time, alternating like the squirrels of the morning. Till alarmed by an imitation of a hawks shrill cry – they gradually inflated themselves made themselves more aerial and rose higher & higher into the heavens & were at length lost to sight– Yet all the while earnestly looking scanning the surface of the earth for a stray mouse or rabbit.

131. [Thoreau](#) would combine the entries JOURNAL 2:389 (August 15, 1851), JOURNAL 2:470, and JOURNAL 2:477 in “WHAT SHALL IT PROFIT” as:

[Paragraph 96] It is pathetic for me far in the fields in mid forenoon to hear the village clock striking. The bees on the flowers seem to reprove my idleness. Yet I ask myself to what end do they labor? Is there so much need of honey and wax? Is the industry of mankind truly respectable? Is there such virtue in raking cranberries that those men’s employment whom I now see in the meadow can rightly reprove my idleness? Can I not go over these same meadows after them and rake still more valuable fruits—rake with my mind? Can I not rake a thought perchance which shall be worth a bushel of cranberries? I will not mind the village clock; it marks time for the dead and dying. It sounds like a knell; as if one struck the most sonorous slates in the churchyard with a mallet, and they rang out the words which are engraved on them—*tempus fugit irrevocabile*.¹ I harken for the clock that strikes the eternal hours. What though my walk is desultory—and I do not find employment which satisfies my hunger and thirst, and the bee probing the thistle and loading himself with honey and wax seems better employed than I, my idleness is better than his industry. I would rather that my spirit hunger and thirst than that it forget its own wants in satisfying the hunger and thirst of the body.²

1 Latin: “time flies irrevocably.” Bradley P. Dean has emended the manuscript copy-text by italicizing this phrase.

2. Compare Matthew 5:6.




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[Thoreau](#) made a comment in his JOURNAL that would be trivialized by [Waldo Emerson](#) after Thoreau's death and then utilized, in its trivialized form, by [Franklin Delano Roosevelt](#) in a famous speech, as part of his legitimization of American progress-thinking:

It is not so much the music – as the marching to the music that I feel.... Nothing is so much to be feared as fear. Atheism may comparatively be popular with God himself.

In this comment, of course, Thoreau was quoting a famous aphorism of Montaigne as of 1580 and Lord [Francis Bacon](#) as of 1623 which had, ten years earlier (1831 ) , been plagiarized by [Arthur Wellesley, Duke of Wellington](#), the general who had become utterly famous by being in command of the opposing forces when the forces of [Napoleon Bonaparte](#) were finally defeated on June 18, 1815.

The only thing I am afraid of is fear.

Thoreau was quoting this famous aphorism, so similar to THE BOOK OF PROVERBS (Chapter 3, verse 25 ) , merely by mentioning it, as today we would say “let a thousand flowers bloom” and bring

everyone's mind to Mao's use of this line from a Chinese classic essay.

Having quoted-by-mentioning, Thoreau went directly on to mock the sort of attitude that had produced such a sentiment, and to mock the iron mind of the Duke, by a caustic deduction about atheism.



The gist of Thoreau's deduction was that, were it really true and meaningful that nothing is so much to be

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feared as fear, then atheism, something other than fear, would be something not so much to be feared as fear, and therefore even for God—who of course knows as well as anyone that atheism is a silly doctrine—would prefer being atheistic over being fearful. And we note that this *reductio ad absurdum* occurs in a context in which Thoreau has been ruminating about his mysterious

It is not so much the music — as the marching to the music that I feel.

which was tied of course to the mysterious “different drummer” passage at the end of [WALDEN](#).



[WALDEN](#): Why should we be in such desperate haste to succeed, and in such desperate enterprises? If a man does not keep pace with his companions, perhaps it is because he hears a different drummer. Let him step to the music which he hears, however measured or far away. It is not important that he should mature as soon as an apple-tree or an oak. Shall he turn his spring into summer? If the condition of things which we were made for is not yet, what were any reality which we can substitute? We will not be shipwrecked on a vain reality. Shall we with pains erect a heaven of blue glass over ourselves, though when it is done we shall be sure to gaze still at the true ethereal heaven far above, as if the former were not?

DIFFERENT DRUMMER
THE INNER LIGHT



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The [Duke of Wellington](#) had presumably been recommending a practiced callousness toward the lives and desires of others, a Roman or Trojan accommodation rather than the traditional Greek one which involved staying in touch with one's affect while at the same time overcoming this affect and thus mastering the situation.

Lessing, in his "Laocoön," stated that "Palnatako gave his Jomsburgers the command to fear nothing nor once to utter the word fear." Wonder who those guys were....

Every once in a while, a Thoreau gathering will attract one or another survivalist, who will sit around for awhile in his camouflage shirt and then, hopefully, go about his business. Has anybody noted the link between the fear of fear, and the very contemporary agenda of the "survivalist"?

Today, the importance of doing away with fear is not sufficiently emphasized. Fear is worse than danger, which it both attracts and arouses. Survival is just socialized fear. Life has been so thoroughly consumed by survival that many believe they will lose everything if the means of survival are threatened. They forget that there is a happy way of ridding themselves of the "necessity" of survival, which is to dissolve it in life.

— Vaneigem, Raoul. THE MOVEMENT OF THE FREE SPIRIT: GENERAL CONSIDERATIONS AND FIRSTHAND TESTIMONY CONCERNING SOME BRIEF FLOWERINGS OF LIFE IN THE MIDDLE AGES, THE RENAISSANCE AND, INCIDENTALLY, OUR OWN TIME. NY: Zone Books, 1994, page 294

Here is how the "quotation" appeared in Franklin Delano Roosevelt's first inaugural address on March 4, 1933:

This is pre-eminently the time to speak the truth, the whole truth, frankly and boldly, nor need we shrink from honestly facing conditions in our country today. This great nation will endure as it has endured, will revive and will prosper. So first of all let me assert my firm belief that the only thing we have to fear is fear itself — nameless, unreasoning, unjustified terror which paralyzes needed efforts to convert retreat into advance.

I will quote the usual account of the development of this extrapolation, from Kenneth C. Davis's DON'T KNOW MUCH ABOUT HISTORY: EVERYTHING YOU NEED TO KNOW ABOUT AMERICAN HISTORY BUT NEVER

LEARNED:



Most of Roosevelt's campaign speeches had been written for him, but a handwritten first draft of the inaugural address shows this to be Roosevelt's own work. Yet the speech's most famous line was old wine in a new bottle. Similar sentiments about fear had been voiced before. The historian Richard Hofstadter notes that Roosevelt read Thoreau in the days before the Inauguration and was probably inspired by the line "Nothing is so much to be feared as fear."

This DON'T KNOW MUCH simplification elides the fact that Roosevelt was not reading Thoreau directly, but reading him as filtered through the sensibilities of [Emerson](#). Essentially, it can fairly be said, it was **Emerson** that FDR was reading. And the preacher, sorry to say, couldn't figure out how the trout got in the milk.

If you want an apposite remark about fear, you'll have to look to Eleanor Roosevelt rather than to her husband. Here's one, from a poster hanging on the wall of Professor Anita Hill's office, and you'll notice that Eleanor

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did not think she was quoting anyone:



Anita Hill

***“You gain strength,
courage and confidence
by every experience in
which you really stop to
look fear in the face....
You must do the thing
you think you cannot
do.”***



Eleanor Roosevelt



(Blanche Wiesen Cook, in her new biography ELEANOR ROOSEVELT (New York: Viking, 1992), offers that since Thoreau was one of Mrs. Roosevelt's favorite authors when she taught AmLit at the Todhunter School, and since she had a "copy of Thoreau" (pages 402, 494), it was in this copy of Thoreau that her husband found the quote he used in his first inaugural address. However, I regard such a provenance as entirely unlikely, taking into account that it was in the trivialized form in which the quote had passed through the mentation of Emerson that FDR made use of the quote.)



ASTRONOMY

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Thoreau was simply undeceived by the “religious” life he saw going on around him in Concord and Cambridge, for he clearly perceived the extent to which “religion is a habit, or rather, habit is religion” in the eyes of his friends and relatives, and he clearly perceived the extent to which their vaunted “Christian virtue of hope” was merely a honorific name they assigned to their complicity in their victimization by fear. His conclusion, as above in this remark about fear versus the fear of fear, and about theism versus atheism, was that, if this is what “religion” amounts to, then “to reject RELIGION is the first step.” Shortly after August 15, 1844; 1974, p.159:

[B]ut for fear death itself is an impossibility.

In his 1837 college essay on the sublime, God, he had said, “would be revered, not feared.” Even at that point he was cognizant of the intimate connection between hope and despair, knew how they mutually implicated and reinforced each other in the manner in which the missiles of the USSR once legitimated the missiles of the USA which in turn....

Henry did not learn his faithfulness in church, he learned it from his elder brother, who said as he was dying:

The cup that my Father gives me, shall I not drink it?

“DeQuincey and Dickens have not moderation enough.
They never stutter; they flow too readily.”

—JOURNAL, September 8, 1851

ATTITUDES ON DE QUINCEY

ATTITUDES ON DICKENS



ASTRONOMY

ASTRONOMY

October 27, Monday: Father [Isaac Hecker](#), CSSR wrote to [Orestes Augustus Brownson](#), Esq.

[Waldo Emerson](#) wrote in his journal about how hard it was to believe that the present is as rich as other times, and his phraseology, the matter-of-fact manner in which he uses this superficial talk, about the richness or poverty of the present, is so utterly un-Thoreauvian as to almost pre-empt this terminology from use in the manner in which [Henry Thoreau](#) needs to deploy these terms. This is the sort of thing which leads me to believe that Emerson was never able to grasp what Thoreau was about, that Thoreau's mysticism was utterly opaque to him:

It would be hard to recall the rambles of last night's talk with H.T. But we stated over again, to sadness, almost, the Eternal loneliness... how insular & pathetically solitary, are all the people we know! Nor dare we tell what we think of each other, when we bow in the street. 'Tis mighty fine for us to taunt men of the world with superficial & treacherous courtesies. I saw yesterday, Sunday, whilst at dinner my neighbor Hosmer creeping into my barn. At once it occurred, "Well, men are lonely, to be sure, & here is this able, social, intellectual farmer under this grim day, as grimly, sidling into my barn, in the hope of some talk with me, showing me how to husband my cornstalks. Forlorn enough!" It is hard to believe that all times are alike & that the present is also rich. When this annual project of a Journal returns, & I cast about to think who are to be contributors, I am struck with a feeling of great poverty; my bareness! my bareness! seems America to say.



VENUS

October 27, Monday: This morning I wake and find it snowing & the ground covered with snow—quite unexpectedly—for last night it was rainy but not cold.

The obstacles which the heart meets with are like granite blocks which one alone can not move. She who was as the morning light to me, is now neither [the morning star](#) nor [the evening star](#). We meet but to find each other further asunder, and the oftener we meet the more rapid our divergence. So a star of the first magnitude pales in the heavens, not from any fault in the observers eye nor from any fault in it self perchance, but because its progress in its own system has put a greater distance between

The night is oracular— What have been the intimations of the night? I ask. How have you passed the night? Good night!

My friend will be bold to conjecture, he will guess bravely at the significance of my words.

The cold numbs my fingers this morning. The strong northwest wind blows the damp snow along almost horizontally. The birds fly about as if seeking shelter

Perhaps it was the young of the purple finch that I saw sliding down the grass stems some weeks ago—or was it the white-throated finch? Winter with its **inwardness** is upon us. A man is constrained to sit down, and to think. The ardea minor still with us— Saw a woodcock feeding probing the mud with its long bill under the RR bridge within 2 feet of me for a long time could not scare it far away— What a disproportionate length of bill.— It is a sort of badge they wear as a punishment for greediness in a former state.

The highest arch of the stone bridge is 6 feet 8 inches above the present surface of the water which I should think was more than a foot higher than it has been this summer—and is 4 inches below the long stone in the east abutment.



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November 10, Monday: [Henry Thoreau](#) made a journal entry he was later to copy into his early lecture “WHAT SHALL IT PROFIT” as:

BRAD DEAN'S COMMENTARY

[Paragraph 63] In our science and philosophy even there is no true and absolute account of things—but a petty reference to classes of men and their affairs—often falsely to christianity. At every bush that trips or pricks us—as the problem whether the stars are inhabited or not—we turn and tear one another like fret-ful wild-cats; as if telescopes and microscopes were the tools of a party. Why must we daub the heavens as well as the earth? It was an unfortunate discovery surely that Dr. Kane was a Mason,¹ and that Sir John Franklin was another.² But it was a more cruel suggestion that possibly that was the reason why the former went in search of the latter.

1. Bradley P. Dean has emended the manuscript copy-text from “mason.”

2. [Dr. Elisha Kent Kane](#) was the US Navy medical officer who became famous in the early 1850s by leading an expedition to the Arctic in search of [Sir John Franklin](#), the British explorer who was believed to be lost there but who actually had died there in 1847. Kane joined the Order of the Masons just before his expedition set out from New-York on May 31, 1851 (see George W. Corner, DOCTOR KANE OF THE ARCTIC SEAS [Philadelphia: Temple UP, 1972], page 129).

ASTRONOMY

FREEMASONRY

PARANOIA

More than a decade after teaching the boy Cyrus Warren in the [Concord Academy](#), [Henry Thoreau](#) encountered him as a grown man walking along the sidewalk.



November 10, Monday, 1851: ... In relation to politics—to society—aye to the whole out-ward world I am tempted to ask—Why do **they** lay such stress on a particular experience which you have had?— That after 25 years you should meet Cyrus Warren again on the sidewalk! Haven't I budged an inch then?—¹³² This daily routine should go on then like those—it must be conceded—vital functions of digestion—circulation of the blood &c which in health we know nothing about. A wise man is as unconscious of the movements in the body politic as he is of digestion & the circulation of the blood in the natural body. ...

I will include here a list of those who attended this [Concord Academy](#). I do not know why the name of Cyrus Warren is absent from the list:

132. [Henry Thoreau](#) was later to copy this into his early lecture “WHAT SHALL IT PROFIT” as:

[Paragraph 61] In relation to politics, to what is called society—aye, often to the whole outward world, I am often tempted to ask—why such stress is laid on a particular experience which you have had?—that after twenty-five years you should meet Hobbins—registrar of deeds, again on the side-walk?¹ Haven't I budged an inch then?

BRAD DEAN'S COMMENTARY

1. There were no County Registrars of Deeds by the name of Hobbins in Massachusetts from 1823 to 1862.

ROSS/ADAMS COMMENTARY



ASTRONOMY

ASTRONOMY

Martha Adams	
Mary Ball	
Elizabeth W. Barrett	
Martha Barrett	
Hannah Reed Batcheller	Grafton
Sarah Stone Batcheller	Grafton
Mary Bowers	Chelmsford
Helen Bowers	Boston
Caroline Brooks	
Sarah Brown	
Sarah Davis Clarke	Brookline
Susan Colburn	Clairborn, Alabama
Nancy Conant	Littleton
Eliza A. Cutler	Lexington
Abby Hubbard Davis	
Agusta Davis	
Mary Davis	
Cynthia F. Dennis	
Martha Field	Lincoln
Lucy Fiske	Lincoln
Elizabeth Gates	Ashby
Elizabeth Hoar	
Sarah S. Hoar	
Ann P. Hosmer	
Helen M. Hosmer	
Rebecca P. Hubbard	
Susan H. Hubbard	
Lucy M. Mann	
Lucy Miles	



ASTRONOMY

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Harriet N. Pratt	
Martha Prescott	
Amelia M. Prichard	
Elizabeth H. Prichard	
Frances J. Prichard	
Lucia M. Rice	
Sarah E. Shattuck	
Sarah Dodge Sitwell	Boston
Maria Smith	Lincoln
Eliza B. Stacy	
Mary Stow	
Jane Tarbell	Lincoln
Sophia Thoreau	
Mary Wetherby	Acton
Louisa J. Whiting	
Ann M. Whiting	
Eliza Woodward	
Susan H. Wyman	
William Baker	
Jonathan F. Barrett	
Gorham Bartlett	
Edwin Bent	
Alber W. Bridge	
George M. Brooks	
John Brown	
Leonard Brown	
Elbridge Clark	
Asabel Dakin	
Hiram Dennis	
Josiah G. Davis	
William Derby	



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Isaac Fiske	
Deming J. Hastings	
George Heywood	
Stephen Hidden	
Ebenezer R. Hoar	
Edward S. Hoar	
George F. Hoar	
Samuel Hoar	
James Hosmer	
Silas T. Jewell	
B.F. Johnson	
John S. Keyes	
Rufus B. Lawrence	Groton
George Loring	
Elbridge Marshal	Littleton
John Maynard	
Richmond Nichles	Carlisle
S.S. Niles	
Nathaniel Parker	
Owen Peabody	
Samuel Pierce	
Charles Prescott	
Moses Prichard	
William Prichard	
Agustus Robbins	Harvard
Henry Shattuck	
William Shepherd	
John D. Sherman	Lincoln
Francis Smith	Lincoln
Edward Stearns	Lincoln
Daniel Stedman	Boston

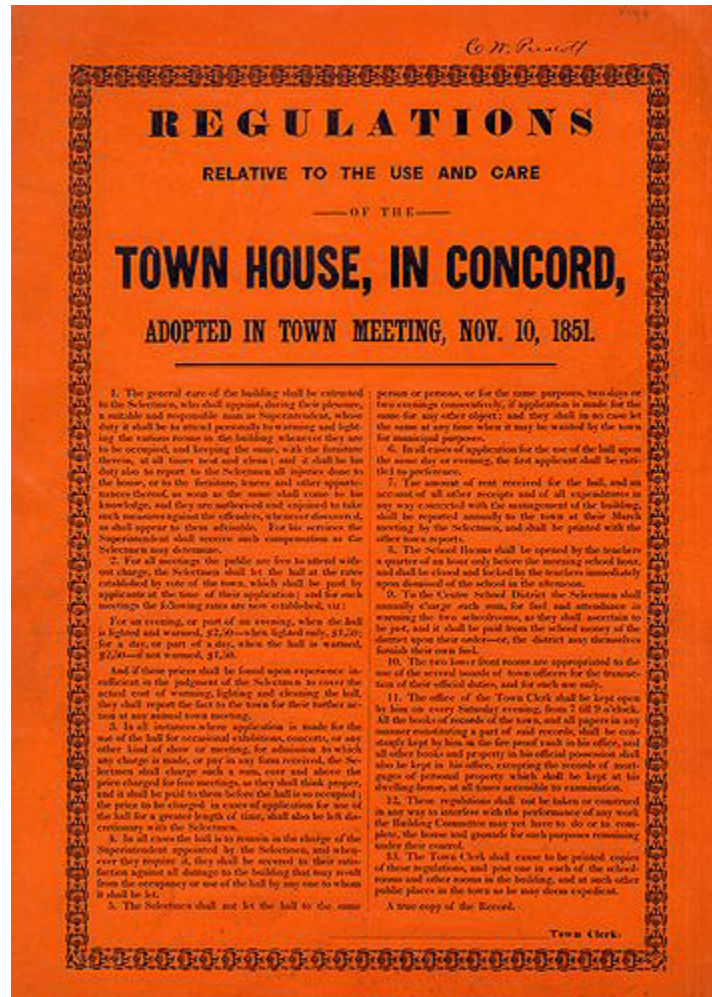


ASTRONOMY

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Nathan Brooks Stow	
William Thayer	
Isaac Thayer	
John Thoreau	
Henry Thoreau	
William Tuttle	Littleton
Agustus Tuttle	
Henry Vose	Boston
Amiel Whipple	
William Whiting	
James Barrett Wood	

The Town Meeting of [Concord](#) adopted regulations relative to the use and care of the new Town House:



December 23, Tuesday: The Savannah [Republican](#) and the Memphis [Enquirer](#) reported the flogging of a man named Atkins at Vicksburg who had been “tampering with negroes” by forging passes, for \$10 each, which hopefully might help them escape to a free state:

LYNCHED.—A man named Atkins was detected at Vicksburg a few days ago, tampering with negroes, offering to sell them passes, for \$10 each, which he assured them would guarantee their safe escape to a free state. He was punished with between 300 and 400 lashes and turned loose. There is reason to believe that there are some rascals of this same stripe with Atkins prowling about Memphis. Our police should be on the alert, and if any of them should be caught, they may be assured of a still more condign punishment than even that which Atkins received at Vicksburg.—*Memphis Enquirer.*



December 23, Tuesday: It would give me such joy to know that a friend had come to see me and yet

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that pleasure I seldom if ever experience.
 It is a record of the mellow & ripe moments that I would keep.
 I would not preserve the husk of life – but the kernel.
 When the cup of life is full and flowing over – preserve some drops as a specimen-sample. When the intellect enlightens the heart & the heart warms the intellect.
 Thoughts will sometimes possess our heads when we are up and about our business which are the exact counterpart of the bad dreams which we sometimes have by night. And I think that the intellect is equally inert in both cases. Very frequently, no doubt – the thoughts men have are the consequence of something which they have eaten or done. Our waking **moods** and **humors** are our dreams but whenever we are truly awake & serene – and healthy in all our senses we have memorable visions. Who that takes up a book wishes for the report of the clogged bowels – or the impure blood?
 Yesterday afternoon I walked to the Stone bridge over the Assabet and thence down the river on the ice to the leaning hemlocks – and then crossed the other branch to the house– Do I not see two kinds of black alder – one blotched the other lighter colored – the former with many small berries crowded – the latter larger & single? Scared up partridges [**Ruffed Grouse** ■ ***Bonasa umbellus***] into the tops of the hemlocks where they thought to conceal themselves–
 Observed where a woodchopper had come to the river & cut a hole for water some days before. The river frozen unexpectedly even – but few open places – had gone down since it froze – & the ice was accordingly bulged up over the rocks in its channel with many fine cracks in all directions. It was a good opportunity to examine the fluvial trees. I was struck by the amount of small interlaced roots – making almost a solid mass – of some red? oaks – on the bank which the water had undermined – opposite Sam. Barrets. Observed by a wall beneath



Nawshawtuct where many rabbits appeared to have played and nearly half a pint of dung was dropped in one pile on the snow.

This morning when I woke I found it snowing – the snow fine & driving almost horizontally as if it had set in for a long storm – but a little after noon it ceased snowing & began to clear up–& I set forth for a walk. The snow which we have had for the last week or 10 days has been remarkably light & dry. It is pleasant walking in the woods now when the sun is just coming out & shining on the woods freshly covered with snow– At a distance the oak woods look very venerable – a fine hale wintry aspect things wear – and the pines all snowed up even suggest comfort. Where boughs cross each other much snow is caught – which now in all woods is gradually tumbling down– By half past 3 the sun is fairly out. I go to the cliffs. There is a narrow ridge of snow a white line on the storm side of the stem of every exposed tree. I see that there is to be a fine clear sunset. & make myself a seat in the snow on the cliff to witness it. Already a few clouds are glowing like a golden sierra just above the horizon– From a low arch the clear sky has rapidly spread eastward over the whole heavens – and the sun shines serenely – and the air is still – and the spotless snow covers the fields. The snow storm is over – the clouds have departed – the sun shines serenely – the air is still – a pure & trackless white napkin covers the ground – and a fair evening is coming to conclude all– Gradually the sun sinks – the air grows more dusky & I perceive that if it were not for the light reflected from the snow it would be quite dark– The wood chopper has started for home. I can no longer distinguish the color of the red oak leaves against the snow – but they appear black. The partridges [**Ruffed Grouse** ■ ***Bonasa umbellus***] have come forth to bud on the apple trees. Now the sun has quite disappeared – but the after-glow as I may call it – apparently the reflection from

VENUS

the cloud beyond which the sun went down from the thick atmosphere of the horizon – is unusually bright & lasting – Long broken clouds in the horizon in the dun atmosphere (as if the fires of day were still smoking there) hang with red & golden edging like the saddle cloths of the steeds of the sun. Now all the clouds grow black–& I give up to night– But unexpectedly half an hour later when I look out having got home I find that the evening star is shining brightly & beneath all the west horizon is glowing red – that dun atmosphere instead of clouds reflecting the sun – and I detect just above the horizon the narrowest imaginable white sickle of the new moon.¹³³



December 27, Saturday: The New Brunswick Courier provided an eye-witness's account of a deadly unexplained struggle that had taken place the previous morning near Lands End in Westfield Parish:

The Westfield Tragedy!

Eye Witness Account: On Sunday 7th inst., about 2 o'clock in the morn., William KERRIGAN residing near Lands End, Westfield Parish (Kings Co.) sent his sons to the house of William WAGONER with a message desiring his wife who was staying there to return home and also requesting John C. McGLAUGHLIN to accompany her, assigning as a reason that he was unwell. He had previously sent a person named CARR to his wife and daughter as also to the widow of William McCLUSKEY requesting them to come to his house. On the arrival of the above persons at KERRIGAN's house, he appeared highly pleased, shook hands with them and said that they were good neighbours. He asked McGLAUGHLIN to sing a hymn, which was complied with; after which KERRIGAN proceeded to prayer and while so engaged, kissed the ground several times. He was then observed to take from a cupboard a large draw-knife with which he instantly rushed upon McGLAUGHLIN inflicting a large wound on the head. McGLAUGHLIN succeeded in escaping from the house and the maniac then turned upon WAGONER. WAGONER also ran from the house, followed by his wife, son and daughter and the widow McCLUSKEY. The murderer instantly persued them and cut down his own wife and son. He then rushed upon Mr. WAGONER and inflicting a wound on the side of the head, he turned upon the widow McCLUSKY and cut her down. KERRIGAN turned in pursuit of his daughter and came up with the hapless victim at a fence and killed her on the spot. The murderer ran back to the widow McCLUSKEY who lay extended on the ground and on seeing him she cried out, "Oh William, spare my life and let me go to my poor little children." KERRIGAN answered "Get up and go, you devil!" "She did so, upon which he immediately killed her saying that he would kill all those who came before him. KERRIGAN then returned to where his wounded wife and son lay and killed them. Meanwhile William WAGONER had proceeded to his own house and informed his son Richard WAGONER who was in bed that KERRIGAN had killed his mother. The youth immediately dressed himself and seeing from the window KERRIGAN approaching the house, armed himself with a gun and went out to meet him. KERRIGAN, having

133. December 22nd and 23rd had been the nights of no moon, so this would be the barest sliver.



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come up, aimed a blow with the knife at the elder WAGONER who avoided it and closed in with the murderer. Richard WAGONER then struck KERRIGAN two blows on the head with the gun which prostrated him and in doing so the barrell became seperated from the stock of the piece. Unfortunately KERRIGAN succeeded in rising and ran at the boy Richard with the dreadful knife. The boy defended himself with the barrel of the gun but not without receiving a severe wound in one of the fingers. KERRIGAN, somewhat disconcerted by the resistance offered, jumped back when the boy Richard succeeded in inflicting a heavy blow with the gun barrel on the side of KERRIGAN's head which brought him to the earth. In this position KERRIGAN shouted to the elder WAGONER "Will you let him kill me?" adding "Richard, you think you are a d___ smart fellow, but I am smarter than you are." KERRIGAN then rose from the ground and on finding that his arm was fractured exclaimed "Oh Lord, I am done forever! He then ran off towards the residence of Alexander LONG, seeing which, Wm WAGONER informed LONG of the fact and directed him to procure an axe. LONG did so, and KERRIGAN seeing the probable nature of his reception, turned and ran towards the River. Some neighbours having by this time collected, proceeded to carry Mrs. WAGONER to her house and the bodies of the other four victims were conveyed to KERRIGAN's house. Search was now made for the murderer and at 8 o'clock the same morn., KERRIGAN was found near the River leaning over a fence. His hands and feet were badly frozen. He was bare-headed and his clothing consisted of only a cotton shirt, trousers and drawers. KERRIGAN requested to be taken to a fire, but desired his captors not to put him too near it. He was then conveyed to his own house, and his wounds having been dressed, he was put into a bed near the fire, a strong guard having been appointed to watch him. KERRIGAN died on the same eve. It is reported that Mrs. Wagoner died Saturday 11th inst. and William WAGONER could not live.



Sat December 27, Saturday: Sunset from Fair Haven Hill. This evening there are many clouds in the west into which the sun goes down so that we have our visible or apparent sunset and red evening sky as much as 15 minutes before the real sunset. You must be early on the hills to witness such a sunset by half past 4 at least. Then all the vales even to the horizon are full of a purple vapor – which half veils the distant mts – and the windows of undiscoverable farm houses – shine like an early candle or a fire– After the sun has gone behind a cloud – there appears to be a gathering of clouds around his setting and for a few moments his light in the amber sky seems more intense brighter & purer than at noon day.

I think you never see such a brightness in the noonday heavens as in the western sky sometimes just before the sun goes down in clouds, like the extasy which we told sometimes lights up the face of a dying man – that is a **serene** or evening death – like the end of the day. Then at last through all the grossness which has accumulated in the atmosphere of day – is seen a patch of serene sky fairer by contrast with the surrounding dark than midday – and even the gross atmosphere of the day is gilded and made pure as amber by the setting sun as if the days sins were forgiven it. The man is blessed who every day is permitted to behold anything so pure & serene as the western sky at sunset – while revolutions vex the world.

There is no winter necessarily in the sky though the snow covers the earth. The sky is always ready to answer to our moods– We can see summer there or winter. Snow & drifts on the earth – it swiftly descends from the heavens & leaves them pure. The heavens present perhaps pretty much the same aspect summer & winter.

It is remarkable that the sun rarely goes down without a cloud.

Venus – I suppose it is – is now **the evening star** – and very bright she is immediately after sun set in the early twilight.

VENUS

**1852**

REVISED EDITION of [Elijah Hinsdale Burritt](#)'s THE GEOGRAPHY OF THE HEAVENS, AND CLASS BOOK OF [ASTRONOMY](#): ACCOMPANIED BY A CELESTIAL ATLAS.... (New York: F.J. Huntington and Mason & Law) by a Methodist minister, the Reverend Hiram Mattison, Professor of Natural Philosophy in the Falley Seminary (February 11, 1811-November 24, 1868).

It has been asserted that 1852 was "Thoreau's *annus mirabilis*, the year his months of living deliberately yielded a magnificent harvest." [Waldo Emerson](#) commented in his journal, during this period, with a singular lack of the usual condescension, that:

Henry Thoreau's idea of the men he meets, is, that they are his old thoughts walking. It is all affectation to make much of them, as if he did not long since know them thoroughly.

In the previous century [Jean-Jacques Rousseau](#) had had his *annus mirabilis*, the year his months of living deliberately yielded a magnificent harvest, in the year 1762. So — just what was the relationship of [Henry Thoreau](#) the American nature-boy with that [Swiss](#) nature-boy of the previous century? We can discover precisely the answer to this one, by considering Thoreau's one reference to Rousseau, a reference which occurred in this year:



February 17, Tuesday: Perhaps the peculiarity of those western vistas was partly owing to the shortness of the days when we naturally look to the heavens & make the most of the little light.— When we live an arctic life. When the woodchopper's axe reminds us of twilight at 3 o'clock. P m. When the morning & the evening literally make the whole day—
When I travelled as it were between the portals of the night—& the path was narrow as well as blocked with snow.
Then too the sun has the last opportunity to fill the air with vapor.
I see on the Walden road that the wind through the wall is cutting **through** the drifts leaving a portion adhering to the stones.
It is hard for the traveller when in a cold & blustering day the sun and wind come from the same side— Today the wind is North W. or W by N & the sun from the S W.
The apothecia of lichens appears to be a fungus.— all fruit.
I saw Patrick Riorden carrying home an armful of faggots from the woods to his shanty on his shoulder. How much more interesting an event is that man's supper who has just been forth in the snow to hunt or perchance to steal the fuel to cook it with. His bread & meat must be sweet. It was something to hear that the women of Waltham used the *Parmelia saxatilis*? in dying
If you would read books on botany go to the fathers of the science— Read Linnaeus at once, & come down from him as far as you please— I lost much time reading the Florists. It is remarkable how little the mass of those interested in botany are acquainted with Linnaeus. His *Philosophia Botanica* which [Rousseau](#) Sprengel & others praised so highly — I doubt if it has ever been translated into English.— It is simpler more easy to understand & more comprehensive — than any of the hundred manuals to which it has given birth— A few pages of cuts representing the different parts of plants with the botanical names attached — is worth whole volumes of explanation.
According to Linnaeus's classification, I come under the head of the **Miscellaneous** Botanophilists. "Botanophili sunt, qui varia de vegetabilibus tradiderunt, licet ea non proprie ad scientiam Botanicam spectant" — either one of the *Biologi* (Panegyrica plerumque exclamarunt) or *Poetae*.

CAROLUS LINNAEUS



ASTRONOMY

ASTRONOMY

This was the year in which Thoreau originated, in pencil, his parable of the artist of Kouroo, in which he depicts time as an illusion with which we need to make no compromise:

WALDEN: There was an artist in the city of Kouroo who was disposed to strive after perfection. One day it came into his mind to make a staff. Having considered that in an imperfect work time is an ingredient, but into a perfect work time does not enter, he said to himself, It shall be perfect in all respects, though I should do nothing else in my life. He proceeded instantly to the forest for wood, being resolved that it should not be made of unsuitable material; and as he searched for and rejected stick after stick, his friends gradually deserted him, for they grew old in their works and died, but he grew not older by a moment. His singleness of purpose and resolution, and his elevated piety, endowed him, without his knowledge, with perennial youth. As he made no compromise with Time, Time kept out of his way, and only sighed at a distance because he could not overcome him. Before he had found a stock in all respects suitable the city of Kouroo was a hoary ruin, and he sat on one of its mounds to peel the stick. Before he had given it the proper shape the dynasty of the Candahars was at an end, and with the point of the stick he wrote the name of the last of that race in the sand, and then resumed his work. By the time he had smoothed and polished the staff Kalpa was no longer the pole-star; and ere he had put on the ferule and the head adorned with precious stones, Brahma had awoke and slumbered many times. But why do I stay to mention these things? When the finishing stroke was put to his work, it suddenly expanded before the eyes of the astonished artist into the fairest of all the creations of Brahma. He had made a new system in making a staff, a world with full and fair proportions; in which, though the old cities and dynasties had passed away, fairer and more glorious ones had taken their places. And now he saw by the heap of shavings still fresh at his feet, that, for him and his work, the former lapse of time had been an illusion, and that no more time had elapsed than is required for a single scintillation from the brain of Brahma to fall on and inflame the tinder of a mortal brain. The material was pure, and his art was pure; how could the result be other than wonderful?

PEOPLE OF
WALDEN

ARTIST OF KOUROO

(One of our unanswered questions about Thoreau's writing is how he came to identify the North Star as named "Kalpa." Was this simply a misunderstanding — or did he have access to some Hindu astronomical text of which we have lost track?)

TIMELINE OF WALDEN

Here are excerpts from Thoreau's journal for this timeframe that Peter Borst has found of particular relevance:



The catnep is now up, with a lustrous purple tinge to the underside of its leaves. There is something in its fragrance as soothing as balm to a sick man. It advances me ever to the autumn and beyond it. How full of reminiscence is any fragrance! (5/7)



Methinks the scent is a more primitive inquisition than the eye, more oracular and trustworthy. When I criticise my own writing, I go by the scent, as it were. The scent reveals, of course, what is concealed from the other senses. By it I detect earthiness. (5/8)



The best men I know are not serene, a world in themselves. They dwell in form and study effect, only more finely than the rest. The world to me appears uninhabited. ... Where are the men who dwell in thought? Talk,— that is palaver! at which men hurrah and clap! The manners of a bear are so far good that he does not pay you any compliments. (5/11)



Nature must be viewed humanly to be viewed at all; that is, her scenes must be associated with humane affections, such as are associated with one's native place, for instance. She is most significant to a lover. A lover of nature is preeminently a lover of man. (6/29)



Nature is reported not by him who goes forth consciously as an observer, but in the fullness of life. To such a one she rushes to make her report. To the full heart she is all but a figure of speech. This is my year of observation, and I fancy my friends are also more devoted to outward observation than ever before, as if it were an epidemic. (7/2)



The wood thrush's is no opera music; it is not so much the composition as the strain, the tone,— cool bars of melody from the atmosphere of everlasting morning evening. It is the quality of the song, not the sequence. In the peewee's note there is some sultriness, but in the thrush's, though heard at noon, there is a liquid coolness of things that are drawn from the bottom of springs. The thrush alone declares the immortal wealth and vigor that is in the forest. Here is a bird in whose strain the story is told, though Nature waited for the science of aesthetics to discover it to man. Whenever a man hears it, he is young, and Nature is in her spring. Whenever he hears it, it is a new world and a free country, and the gates of heaven are not shut against him. Most other birds sing from the level of my ordinary cheerful hours — a carol; but this bird never fails to speak to me out of an ether purer than I breathe, of immortal beauty and vigor. He deepens the significance of all things seen in the light of his strain. He sings to make men take higher and truer views of things, He sings to amend their institutions; to relieve the slave on the plantation and the prisoner in his dungeon, the slave in the house of luxury and the prisoner of his own low thoughts. (7/5)



I only know myself as a human entity, the scene, so to speak, of thoughts and affections, and am sensible of a certain doubleness by which I can stand as remote from myself as from another. However intense my experience, I am conscious of the presence and criticism of a part of me which, as it were, is not a part of me, but spectator, sharing no experience, but taking note of it, and that it is no more I than it is you. When the play — it may be the tragedy of life — is over, the spectator goes his way. It was a kind of fiction, a work of the imagination only, as far as he was concerned. (8/8)



I must walk more with free senses. It is as bad to “study” stars and clouds as flowers and stones. I must let my senses wander as my thoughts, my eyes see without looking. Carlyle said that how to observe was to look, but I say that it is rather to see, and the more you look the less you will observe. I have the habit of attention to such excess that my senses get no rest, but suffer from a constant strain. Be not preoccupied with looking. Go not to the object; let it come to you. When I have found myself ever looking down and confining my gaze to the flowers, I have thought it might be well to get into the habit of observing the clouds as a corrective; but no! that study would be just as bad. What I need is not to look at all, but a true sauntering of the eye. (9/13)



Dreamed of purity last night. The thoughts seemed not to originate with me, but I was invested, my thought was tinged, by another's thought. It was not that I originated, but that I *entertained* the thought. (9/23)



I had a thought in a dream last night which surprised me by its strangeness, as if it were based on an experience in a previous existence, and could not be entertained by my waking self. Both the thought and the language were equally novel to me, but I at once perceived it to be true and to coincide with my experience in

this state. (11/23)



It is worth the while to apply what wisdom one has to the conduct of his life, surely. I find myself oftenest wise in little things and foolish in great ones. That I may accomplish some particular petty affair well, I may live my whole life coarsely. A broad margin of leisure is as beautiful in a man's life as in a book. Haste makes waste, no less in life than in housekeeping. Keep the time, observe the hours of the universe, not of the cars. What are threescore and ten hurriedly and coarsely lived to moments of divine leisure in which your life is coincident with the life of the universe? We live our lives too coarsely, just as we eat too fast, and do not know the true savor of our food. We consult our will and understanding and the expectation of men, not our genius. I can impose upon myself tasks which will crush me for life and prevent all expansion, and this am but too inclined to do.

That aim in life is highest which requires the highest and finest discipline. How much, what infinite, leisure it requires, as of a lifetime, to appreciate a single phenomenon! You must camp down beside it as for life, having reached your land of promise, and give yourself wholly to it. It must stand for the whole world to you, symbolical of all things. The least partialness is your own defect of sight and cheapens the experience fatally.



I am somewhat oppressed and saddened by the sameness and apparent poverty of the heavens,— that these irregular and few geometrical figures which the constellations make are no other than those seen by the Chaldean shepherds. ... I pine for a new world in the heavens as well as on the earth, and though it is some consolation to hear of the wilderness of stars and systems invisible to the naked eye, yet the sky does not make that impression of variety and wildness that even the forest does, as it ought. ... I seem to see it pierced with visual rays from a thousand observatories. It is more the domain of science than of poetry. But it is the stars as not known to science that I would know, the stars which the lonely traveller knows.

The Chaldean shepherds saw not the same stars which I see, and if I am elevated in the least toward the heavens, I do not accept their classification of them. I am not to be distracted by the names which they have imposed. The sun which I know is not Apollo, nor is the evening star Venus. The heavens should be as new, at least, as the world is new. ... If they appear fixed, it is because hitherto men have been necessitated to see them. I see not merely old but new testaments in the stars. Do I not stand as near to the stars as the Chaldean shepherds?

A few good anecdotes is our science, with a few imposing statements respecting distance and size, and little or nothing about the stars as they concern man; teaching how he may survey a country or sail a ship, and not how he may steer a life. ... Nobody sees the stars now. They study astronomy at the district school, and learn that it is 95 millions of miles distant, and the like,— a statement which never made any impression on me, because I never walked it, and which I cannot be said to believe. ... Though observatories are multiplied, the heavens receive very little attention. The naked eye may easily see farther than the armed. It depends on who looks through it. No superior telescope to this has been invented. In those big ones the recoil is equal to to the discharge. The poet's eye in fine frenzy rolling ranges from earth to heaven, but this the astronomer's does not often do. It does not see far beyond the dome of the observatory. Compared with the visible phenomena of the heavens, the anecdotes of science affect me as trivial and petty....

As I walk the railroad causeway I am, as the last few months, disturbed by the sound of my steps on the frozen ground. I wish to hear the sound of the silence of the night, for the silence is something positive and to be heard. ... I must stand still and listen with open ears, far from the noises of the village, that the night may make its impression on me. A fertile and eloquent silence. ... Silence alone is worthy to be heard. Silence is of various depth and fertility, like soil. ... The silence rings; it is musical and thrills me. A night in which the silence was audible. I hear the unspeakable. (1/21/53)

ASTRONOMY

ASTRONOMY

Johann von Lamont of [Germany](#) reported on 15 years of observations of the earth's magnetic field, providing the information that it fluctuated on a 10.3-year cycle. He did not notice that this fluctuation of the earth's magnetic field coincided with the sunspot cycle of the sun, but that information was provided in this year, independently, by Sir Edward Sabine in the British Isles, Rudolf Wolf in [Switzerland](#), and Alfred Gautier in France. The study of relationships between solar phenomena and terrestrial phenomena had fairly begun.

ASTRONOMY

At some point during the early 1850s (I will for convenience insert the data element here), [Alvan Graham Clark](#) joined the family firm of [Alvan Clark & Sons](#) in Cambridge, Massachusetts in the development and manufacture of lenses for large refracting telescopes.



January 23, Friday: The case of John Gordon, [hanged](#) for the murder of Amasa Sprague, had been being discussed in [Rhode Island](#) for seven years. Had he been guilty of a crime, or had he been the innocent [Catholic](#)/Irish impoverished immigrant victim of a rush to judgment and a judicial murder?

The Orléans family (the former ruling house) was banned from France by President Louis-[Napoléon](#) Bonaparte.



January 23, Friday: The snow is so deep & the cold so intense that the crows [**American Crow** *Corvus brachyrhynchos*] are compelled to be very bold in seeking their food – and come very near the houses in the village. One is now walking about & pecking the dung in the street in front of Frank Munroe's. They remind me as they sail along over the street of the turkey buzzards of the south & perhaps many hard winters in succession would make them as tame.

There is a vegetable life as well as a spiritual & animal life in us – for the hair & nails continue to grow after the *anima* has left the body & the spiritual & animal life it is dead. There is also probably an inorganic mineral life.

The surface of the snow on the 20th was not yet disturbed or rippled even by the wind.

P.m. Deep Cut going to Fair Haven Hill No music from the telegraph harp on the causeway – where the wind is strong but in the cut this cold day I hear memorable strains. What must the birds & beasts think where it passes through woods – who heard only the squeaking of the trees before? I should think that these strains would get into their music at last. Will not the mocking bird be heard one day inserting this strain in his medley? It intoxicates me. Orpheus is still alive – All poetry and mythology revive – The spirits of all bards sweep the strings. I hear the clearest silver lyre-like tones – Tertaeon tones. I think of menander & the rest – It is the most glorious music I ever heard. All those bards revive & flourish again in that half-hour in the deep-cut. The breeze came through an oak still wearing its dry leaves The very fine clear tones seemed to come from the very core & pith of the telegraph pole. I know not but it is my own chords that tremble so divinely. There are barytones –



ASTRONOMY

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& high sharp tones &c Some come sweeping seemingly from further along the wire. The latent music of the earth had found here a vent. Music AEolian – There were 2 strings in fact one each side
I do not know but this will make me read the Greek poets. Thus as ever the finest uses of things are the accidental. Mr Morse did not invent this music.

I see where the squirrels have torn the pine-cones in pieces for the sake of to come at their seeds. And in some cases the **mice**? have nibbled the buds of the pitch pines where the plums have been bent down by the snow. The Blue Hills of Milton are now White.

[Lindley](#) in Loudon dismisses the winter berries by saying “The species are low shrubs of little beauty.”

There are some whose ears help me so that my things have a rare significance when I read to them. It is almost too good a hearing – so that for the time I regard my own writing from too favorable a point of view.

Just before sunset there were few clouds or specks to be seen in the western sky – but the sun gets down lower, and many dark clouds are made visible – their sides toward us being darkened. In the bright light they were but floating feathers of vapor – now they swell into dark evening clouds.

It is a fair sunset with many purplish fishes in the horizon – pinkish & golden with bright edges – like a school of purplish whales they sail or float down from the north – Or like leopards skins they hang in the west. – If the sun goes behind a cloud – it is still reflected from the least haziness or vapor in that part of the sky – the air is so clear – and the after glow is remarkably long – And now the blaze is put out – and only a few glowing clouds like the flickering light of the fire skirt the west. And now only the brands and embers mixed with smoke make an Indian red along the horizon. And the new moon¹³⁴ & [the evening star](#) together preside over the twilight scene.

The thermometer was at 21° this morning

Some botanical names have originated in a mere blunder. Thus the *Cytharexylum melanocardium* of the West Ind. “called by the French *fidele*, from its faithfulness or durability in building,” the English have corrupted into fiddle-wood & so the genus goes. It is unfit for musical instruments – [Lindley](#)

VENUS

134. January 21st and 22nd had been the nights of no moon.

ASTRONOMY

ASTRONOMY

February 2, Monday: [Henry Thoreau](#) returned the Loudon volume *ENCYCLOPAEDIA OF PLANTS* to the [Boston Society of Natural History](#) and checked out, from [Harvard Library](#), Carl von Linné's *CAROLI LINNÆ ... PHILOSOPHIA BOTANICA* (1751).



He also checked out [Louis-Armand de Lom d'Arce, Baron de Lahontan](#)'s *NOUVEAUX VOYAGES DE MR LE BARON DE LAHONTAN DANS L'AMÉRIQUE SEPTENTRIONALE, QUI CONTIENNENT UNE RÉLATION DES DIFFÉRENS PEUPLES QUI Y HABITENT; LA NATURE DE LEUR GOUVERNEMENT; LEUR COMMERCE, LEURS COUTUMES, LEUR RELIGION, & LEUR MANIÈRE DE FAIRE LA GUERRE. L'INTÉRÊT DES FRANÇOIS & DES ANGLOIS DANS LE COMMERCE QU'ILS FONT AVEC SES NATIONS; L'AVANTAGE QUE L'ANGLETERRE PEUT RETIRER DANS CE PAÏS, ÉTANT EN GUERRE AVEC LA FRANCE. LE TOUT ENRICHI DE CARTES & DE FIGURES. TOME PREMIER* (A. La Haye, chez les Frères l'Honoré, Marchands Libraires, 1703)

MEMOIRES ... (VOL. I)

and *MEMOIRES DE L'AMÉRIQUE SEPTENTRIONNALE, OU LA SUITE DES VOYAGES DE MR LE BARON DE LA HONTAN. QUI CONTIENNENT LA DEFCRIPTION D'UNE GRANDE ÉTENDUE DE PAÏS DE CE CONTINENT, L'INTÉRÊT DES FRANÇOIS & DES ANGLOIS, LEURS COMMERCE, LEURS NAVIGATIONS, LEURS MŒURS & LES COÛTUMES DES SAUVAGES, &C. AVEC UN PETIT DICTIONNAIRE DE LA LANGUE DU PAÏS. LE TOUT ENRICHI DE CARTES & DE FIGURES. TOME SECOND.* (A. La Haye, chez les Frères l'Honoré, Marchands Libraires, 1703), making his notes in his Indian Notebook #5 and his Fact Book.

MEMOIRES ... (VOL. II)

"There is no Frigate like a Book
To take us Lands away"
— Emily Dickinson

ASTRONOMY

ASTRONOMY



On this day, as is clear from entries in his Fact Book, he had perused an article in the Boston Daily Evening Traveller, by [Benjamin Apthorp Gould](#) the son, headlined “The Progress of Astronomy During the Last Half Century.” It is clear also in his journal entry, that he was concurrently reading in the 5th edition of [Sir Francis B. Head, Bart.](#)’s THE EMIGRANT (London: John Murray, Albemarle Street, 1847).

THE EMIGRANT





February 2, Monday: [Sir Francis Head](#) says that in America “the moon looks larger” than in Europe Here then more moonshine is to be expected– Perhaps the sun looks larger also. Such are the advantages of the new World.

The same writer says “the heavens of America appear infinitely higher” – – “the stars are brighter”– These too are encouraging facts – symbolical of the height to which the philosophy & poetry and religion of her inhabitants may one day soar. At length perchance the immaterial heaven will appear as much higher to the American mind – and the intimations that star it will appear as much brighter. For I believe that climate does thus react on man – and that there is something in the Mt air that feeds the spirit – & inspires. We shall be more imaginative– We shall be clearer as our sky – bluer, fresher, broader & more comprehensive in our understanding – like our plains– Our intellect on a grander scale – like our thunder & lightning – our rivers & our lakes – & mts & forests.

Are not these advantages? Will not man grow to greater perfection, intellectually as well as physically under these influences? Or is it unimportant how many foggy days there are in his life?

[Sir F. Head](#) thinks that the greater cold –equal to 13 degrees of Lat.– in this country is owing to the extensive forests which prevent the sun & wind from melting the snows –which therefore accumulate on the ground– and creates a cold stratum of air which blown to warmer ones by the N W wind condenses the last into snow– But in Concord woods at any rate the snow – (in the winter) – melts faster – & beside is not so deep as in the fields. Not so toward Spring – on the N sides of hills & in hollows– At any rate I think he has not allowed enough for the warmth of the woods.

The moose (& beaver?) will perchance one day become extinct – but how naturally would a future poet imagine or sculptor carve a fabulous animal with such branching & leafy horns – (when this will in fact exist as a fossil relic) His horns a sort of fucus in bone– –or a lichen. The Elk (moose) may stand with the Gryphon & Dragon & Dodo &c. &c.

The fire-flies & bright plumaged birds! do not they too indicate the peculiarities of the future American [Head](#) “felt that there was something indescribably awful & appalling in all these bestial, birdal, and piscial precautions” at the approach of winter– Going into winter quarters – migrating &c.

[Head](#) coming to Canada in the winter to a house in the fields covered with snow did not know that he was surrounded by a lawn & garden – with gravelled walks – flowers & shrubbery – till the spring thawed the snow. The race that settles & clears the land has got to deal with every tree in the forest in succession– It must be resolute & industrious – and even the stumps must be got out or are– It is a thorough process – this war with the wilderness – breaking nature taming the soil – feeding it on oats

The civilized man regards the pine tree as his enemy. He will fell it & let in the light – grub it up & raise wheat or rye there. It is no better than a fungus to him.

It is natural that we should be enterprising – for we are descended from the enterprising – who sought to better their fortunes in the new world

The Yankee has no leisure to touch his hat to you even if he were so disposed

February 3, Tuesday: Queen Victoria opened Parliament, officially inaugurating the completed houses at Westminster that had been designed by Charles Barry.

In Argentina, insurgents supported by Brazil and Uruguay fought at Caseros and brought about the overthrow of Juan de Rosas.

In the Sophiensaal of Vienna, Fünf Paragraphe aus dem Walzer-Codex op.105 by Johann Strauss was performed for the initial time.



February 3, Tuesday: When I review the list of my acquaintances from the most impartial point of view, and consider each ones excesses & defects of character – which are the subject of mutual ridicule astonishment and pity –, and I class myself among them – I cannot help asking myself if this is the sane world, what must a mad-house be?

It is only by a certain flattery, and an ignoring of their faults that even the best are made available for society. I have been to the Libraries (yesterday) at Cambridge & Boston. It would seem as if all things compelled us to originality. How happens it that I find not in the country, in the field & woods the **works** even of like minded naturalists & poets – Those who have expressed the purest & deepest love of nature – have not recorded it on the bark of the trees with the lichens – they have left no memento of it there – but if I would read their books I must go to the city – so strange & repulsive both to them & to me – & deal with men & institutions with whom I have no sympathy. When I have just been there on this errand, it seems too great a price to pay, for access even to the works of Homer or Chaucer – or Linnaeus. Greece & Asia Minor should henceforth bear Iliads &




Odysseys as their trees lichens. But no! If the works of nature are in any sense collected in the forest – the works of man are to a still greater extent collected in the city. I have sometimes imagined a library i.e. a collection of the works of true poets philosophers naturalists &c deposited not in a brick or marble edifice in a crowded & dusty city – guarded by cold-blooded & methodical officials – & preyed on by bookworms – In which you own no share, and are not likely to – but rather far away in the depths of a primitive forest – like the ruins of central America – where you can trace a series of crumbling alcoves – the older books protecting the more modern from the elements – partially buried by the luxuriance of nature – which the heroic student could reach only after adventures in the wilderness, amid wild beasts & wild men – That to my imagination seems a fitter place for these interesting relics, which owe no small part of their interest to their antiquity – and whose occasion is nature – than the well preserved edifice – with its well preserved officials on the side of a city's square – More terrible than lions & tigers these Cerberuses.

Access to nature for original observation is secured by one ticket – by one kind of expense – but access to the works of your predecessors by a very different kind of expense – All things tend to cherish the originality of the original. Nature at least takes no pains to introduce him to the works of his predecessors – but only presents him with her own *Opera Omnia*.

Is it the lover of nature who has access to all that has been written on the subject of his favorite studies? No; he lives far away from this. It is the lover of books & systems – who know nature chiefly at 2nd hand.

The botanists have a phrase – *Mantissa* – as *Mantissa Plantarum* (Lin.) which I suppose means an over-measure or additional matter about. A convenient term. – Also *Prodromus* – as a forerunner or preparer of the way.


Sueto is an expressive word applied to machinery whose joints are worn – which has got into working order – apparently from *sueo* – to be accustomed. So of the writers faculties.

About 6 Pm walked to Cliffs via RR. The sun had set without a cloud in the sky – a rare occurrence – but I missed the clouds – which make the glory of evening – The sky must have a few clouds – as the mind a few moods – nor is the evening the less serene for them. There is only a tinge of red along the horizon. The moon is nearly full tonight¹³⁵ – and the moment is passed when the light in the east (i.e. of the moon) balances the light in the west. With the Latins apparently there was afternoon – *tempus pomeridianum* or post meridiem – then perhaps sunset *sole occidente* when *sol inclinatus vel decedit* then perhaps evening – when the evening star reigns *vespera* εως περας? (spelling) *vesperascit* the evening approaches. (By the way a studying (or working) by candlelight is a *lucubratio a luce* – study all night is *elucubratio* also *labor vespertinus*. *Serotinus* also means in the evening – & more than that for Pliny says *Praecocibus brevior [vita] quam serotinis*. which cannot be expressed so elegantly in English) After sundown I should have put twilight – *crepusculum* (*crepera lux* or doubtful light) Then comes decided night or *Nox* – *multa nox* – Staying up all night *pervigilium* or *pervigilatio* The night far spent – *Nox adulta* – Midnight *Nox silens vel profunda* – *Meridies noctis* – A starlight night *Nox sideria* – Night-shining *noctulucens* – Night tripping *noctu cursitans* I would not be a mere *tenebrio* or *lucifugus* – shunning the day-light & delighting to skulk in in darkness – but simply I am a *noctivagus* – My walk may be *pernox* but not *pernicius*. They are *Vigiliae Nocturnae*. That little bird that I hear & call the night-warbler  – may be trans.

Noctu suave canens

When the moon does not shine all night it is not a *pernox luna*


Selenites “is a stone (as is said) in Arabia, wherein is a white, which decreases & increases with the moon” Dict. My summer journal was selenitic in this sense. It had this white spot in it.

Venus is now like a little moon in the west – & the lights in the village twinkle like stars. It is perfectly still – & not very cold. The shadows of the trees on the snow are more minutely distinct than at any other season – not dark masses merely – but finely reticulated each limb & twig represented – as cannot be in summer, both from the leaves & the inequality & darkness of the ground. The heavens appear less thickly starred & less habitable than in summer. rather a few bright stars – brought nearer by this splendid twinkling – than countless points in the warm deeps. I hear my old acquaintance the owl [Great Horned Owl  *Bubo virginianus*] from the Causeway. The reflector of the cars as I stand over the deep cut – makes a large & dazzling light in this air – The cars do not make much noise – or else I am used to it and now whizzes the boiling sizzling kettle by me – in which the passengers make me think of potatoes – which a fork would show to be done by this time. The steam is denser for the cold & more white – like the purest downy clouds in the summer sky its volumes roll up between me & the moon. And far behind when the cars are a mile off it still goes shading the fields with its wreathes. The breath of the panting traveller. I now cross from the RR to the road. This snow, which fell day before yesterday is nearly 2 feet deep – pure & powdery – there is but little on the trees except the Pitch pines. From a myriad little crystal mirrors the moon is reflected which is the untarnished sparkle of its surface – I hear a gentle rustling of the oak leaves as I go through the woods. – but this snow has yet no troops of leaves on its surface – The snow evidently by its smooth crust assists in the more equal dispersion & distribution of the leaves which course over it blown by the & perchance for this reason the oak leaves & some others hang on. Now through the Spring woods & up Fair Haven Hill – Here in the midst of a clearing where the choppers have been leaving the woods in pieces today – and the tops of the pine trees are strewn about half buried in snow, only the saw logs being carried off – it is stiller & milder than by day & I think the chopper might work here more comfortably in some respects now – but he is at home in the village getting rest or recreation. Instead of the

135. It would be full on the night of the 4th.

sound of his axe, I hear the hooting of an owl – *nocturnus ululatus* – whose haunts he is laying waste. The ground is all pure white powdery snow which his sled &c has stirred up – except the scattered twigs & pine plumes – I can see every track distinctly where the teamster drove his oxen to the chopper's piles & loaded his sled, & even the tracks of his dog in the moonlight – & plainly to write this.

The moonlight now is very splendid in the untouched pine woods above the Cliffs – alternate patches of shade & light – the light has almost the brightness of sunlight – the fulgor – The stems of the trees are more obvious than by day being simple black against the moonlight & the snow. The sough of the breeze in the pine tops sounds far away like the surf on a distant shore – & for all sound beside there is only the rattling or chafing of little dry twigs – perchance a little snow falling on them – or they are so brittle that they break & fall with the motion of the trees.

My owl [Great Horned Owl  *Bubo virginianus*] sounds hōō hōō hōō—hōō

The landscape covered with snow seen by moonlight from these Cliffs – encased in snowy armor two feet thick – gleaming in the moon & of spotless white. Who can believe that this is the habitable globe. The scenery is wholly arctic. Fair Haven Pond is a Baffin's Bay. Man must have ascertained the limits of the winter before he ventured to withstand it & not migrate with the birds. No cultivated field – no house – no candle. All is as dreary as the shores of the Frozen Ocean. I can tell where there is wood & where open land for many miles in the horizon by the darkness of the former & whiteness of the latter. The trees especially the young oaks covered with leaves stand out distinctly in this bright light from contrast with the snow – It looks as if the snow & ice of the arctic world. travelling like a glacier had crept down southward and overwhelmed & buried New England – And see if a man can think his summer thoughts now – But the evening star is preparing to set – & I will return – Flowndering through snow sometimes up to my middle.

Is not the sky unusually blue tonight? dark blue? Is it not always bluer when the ground is covered with snow in the winter – than in summer?

The forcible writer stands bodily behind his words with his experience – He does not make books out of books, but he has been **there** in person.

Head calls the “sough” an aeolian murmur”

That is a good mythological incident told of the wounded farmer – who his foot being lacerated & held fast between his plough & a fallen tree in a forest clearing – drew his oxen to him – with difficulty smeared their horns with blood which the mosquitoes had sucked from his bare arms – & cutting the reins sent them home as an advertisement to his family.



(George Edwards's A NATURAL HISTORY OF UNCOMMON BIRDS, 1745)

ASTRONOMY

ASTRONOMY

February 26, Thursday: John Harvey Kellogg, the physician who would inspire a flaked-cereal breakfast health industry, was born.

A Daguerreotype was made of the moon by John Adams Whipple through the 15-inch refractor [telescope](#) at the [Harvard Observatory](#).

ASTRONOMY

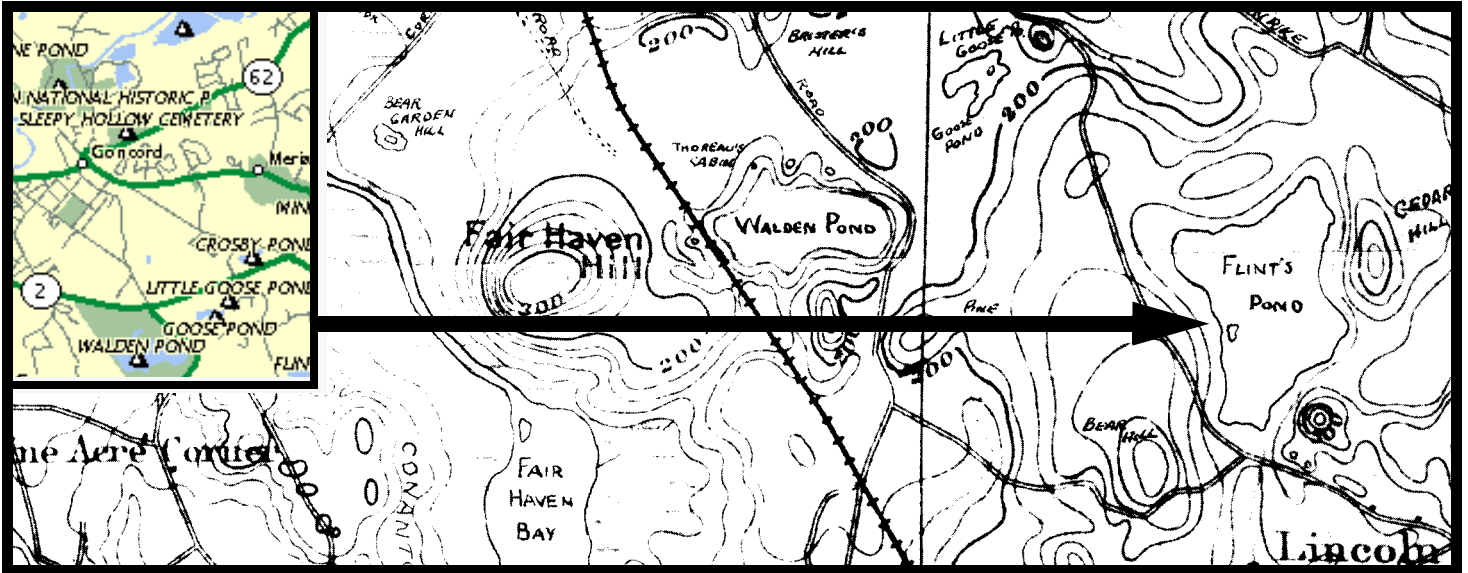


February 26, Thursday: The east side of deep Cut nearly dry – sand has ceased flowing— West side just beginning— Now begin to see the *Cladonia Rangiferina* (“reindeer moss”) in the dry pastures— Observed for the first time on and about Bear Hill in Lincoln the *Parmelia Conspersa*? “greenish straw-colored.” & what I suppose is *P. saxatilis* “glaucous-cinerascent” The *P. Conspersa* is a very handsome & memorable lichen – which every child has admired. I love to find it where the rocks will split into their lamina so that I can easily carry away a specimen. The low hills in the N E beyond Bedford seen from Bear Hill about 4¹/₂ P m were remarkably dark blue much more blue than the mts in the N W. The sky was in great part concealed by white

ASTRONOMY

ASTRONOMY

clouds— Had this blue the same cause with the blue in the crevices of the snow?



Returned across Flint's Pond. & the wood lot where some Irish man must have tried his first experiment in chopping – his first winter – where the trees were hacked off 2 feet from the ground, as if with a hatchet – stand on every sides of the tree by turns & crossing the carf a hundred ways. The owner can commonly tell when an Irish man has trespassed on his wood lot.

We are told today that civilization is making rapid progress – the tendency is ever upward – substantial justice is done even by human courts— You may trust the good intentions of mankind.— We read to-morrow in the newspapers that the French nation is on the eve of going to war with England to give employment to her army. What is the influence of men of principle – or how numerous are they? How many moral teachers has society? Of course, so many as she has (will) resist her— How many resist her? How many have I heard speak with warning voice? Utter wise warnings? The preacher's standard of morality is no higher than that of his audience. He studies to conciliate his hearers & never to offend them. Does the threatened war between France & England evince any more enlightenment – than a war between two savage tribes – the Iroquois & the Hurons? Is it founded in better reason?

April 3, Saturday: [Henry Thoreau](#) wrote again to the Reverend Thomas Wentworth Higginson, accepting his invitation to come to tea at the manse when he lectured in Boston on "Realities":

I certainly do not feel prepared to offer myself as a lecturer to the Boston public, and hardly know whether more to dread a small audience or a large one. Nevertheless I will repress this squeamishness, and propose no alteration in your arrangements.



Meanwhile, [Thoreau](#) was being written to from New-York by [Horace Greeley](#), to ask for an article on the "works and ways" of the Reverend Ralph [Waldo Emerson](#), an article which Thoreau would be unable to write:

*New York, [] April 3^d, 1852.
Fr[i]end Thoreau:*



*I wish you to write me an
article on Ralph Waldo Emerson, [his]
Works and Ways, extending to 100
[pages] or so of [letter sheet] like this, to
take the form of a Review of his Writings,
but to be intended to give some idea of
the Poet, the [g]enius, the Man, with some
idea of the New England Scenery and
which have combined Home influences to make him what he is.
^ Let it be calm, searching, and impartial--
nothing like adulation, but a just summing
up of what he is and what he has done.
I mean to get this in the West[mins]ter Re-
view, but if not acceptable there, I will
publish it elsewhere.
I will pay you \$50 for the article
when delivered[,] in advance ~~wh~~ if
you desire it. Say the wor[d] and I*

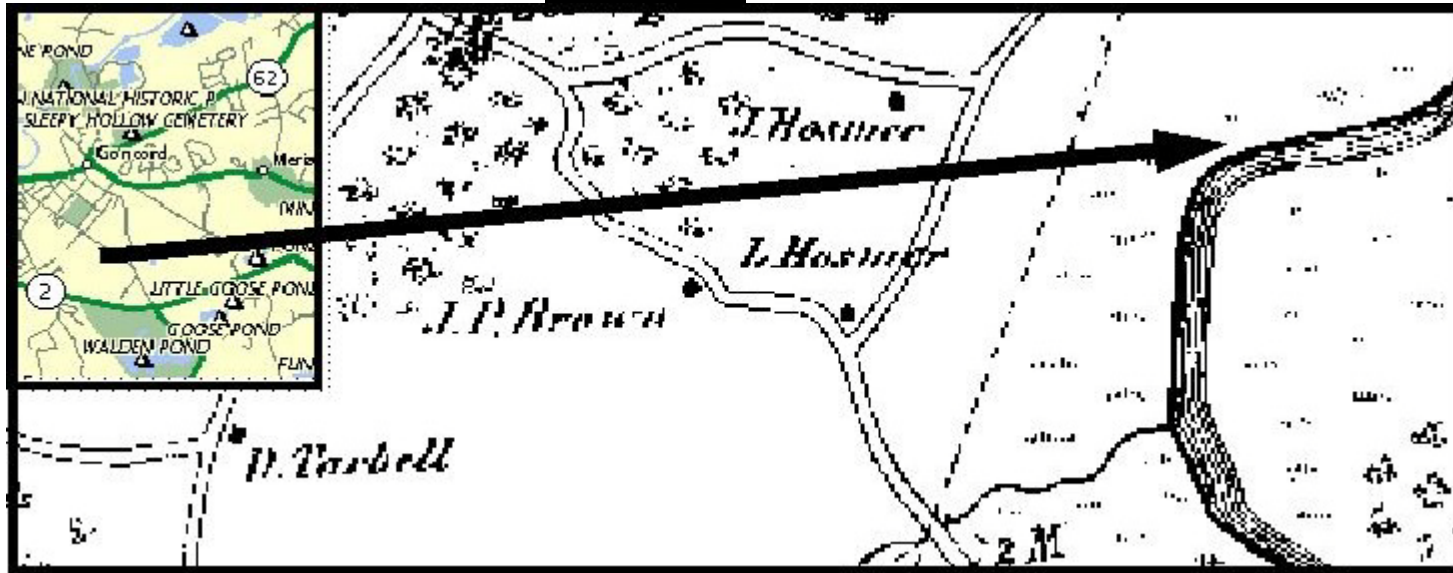
Page 2
*will send the money at once. It is perfectly
convenient to do so. Your 'Carlyle' article
is my model, but you can give us Emerson
better than you did [C]arlyle. I presume he
would allow you to make extracts for
this purpose from his Lectures not
yet published. I would delay the
publication of the article to suit his
publishing arrangements should that
be requested.
Yours[,]
Horace Greeley.
H. [D.] Thoreau,
Concord,*

ASTRONOMY

ASTRONOMY

Mass.

In the full moonlight, at 8:30PM, [Thoreau](#) walked down the bank of the Sudbury River to Clamshell Bank:



April 3, Saturday: They call that northern most sea thought to be free from ice whither the musk oxen migrate "Polina" The coldest natures – persevere with them – go far enough – are found to have open sea in the highest latitudes.

It is a clear day with a cold westerly wind – the snow of yesterday being melted.

When the sun shines unobstructedly, the landscape is full of light, for it is reflected from the withered fawn colored grass – as it cannot be from the green grass of summer.

The blue bird [Eastern Bluebird ■ *Sialia sialis*] carries the sky on his back–



I am going over the hills in the rear of the windmill site & along Peters path. This path through the rolling stubble fields with the woods rather distant and the horizon distant in front on account of the intervention of the river & meadow reminds me a little of the downs of Cape Cod – of the Plains of Nauset. This is the only walk of the kind that we have in Concord. Perhaps it should be called Caesar's path. The maple at the brook by the path has not expanded its buds though that by the Red Bridge had so long ago. What the cause – are they diff. species? I have observed much snow lately on the north slopes where shrub-oaks grow – where probably the ground is frozen – more snow I think than lies in the woods in such positions– It is even 2 or 3 feet deep in many such places – though few villagers would believe it. One side of the village street which runs east & west – appears a month in advance of the other– I go down the street on the wintry side– I return through summer– How agreeable the contrast of light & shade – especially when the successive swells of a hill-side produce the shade. The clouds are important today for their shadows– If it were not for them the landscape would be one glare of light without variety. By their motion they still more vary the scene

Man's eye is so placed as to look straight forward on a level best – or rather down than up– His eye demands the sober colors of the earth for its daily diet. He does not look up at a great angle but with an effort.– Many clouds go over without our noticing them for it would not profit us much to notice it – but few cattle pass by in the street or the field without our knowing it.

The moon appears to be full tonight. about 8¹/₂ P m I walked to the Clam-shell Hill. It is very cold & windy, and I miss my gloves left at home – colder than the last moon. The sky is ²/₃ covered with great 4 or more sided clouds drifting from the N or N W with dark blue partitions between them. The moon with a small brassy halo seems travelling ever through them toward the N. The water is dull & dark except close to the windward shore where there is a smooth strip a rod or more in width protected from the wind – which reflects a faint light. When the moon reaches a clear space the water is suddenly lit up quite across the meadows for half a mile in length and several rods in width, while the woods beyond are thrown more into the shade or seen more in a mass and indistinctly than before. The ripples on the river seen in the moon-light – those between the sunken willow lines have this form.



as if their extremities were retarded by the friction of the banks. I noticed this afternoon – that bank below Caesar's now partially flooded – higher than the neighboring meadow so that sometimes you can walk down on it a mile dryshod with water on both sides of you. Like the banks of the Mississippi. There always appears

VENUS

to be something phosphorescent in moonlight reflected from water. [Venus](#) is very bright now in the west – and orion is there too now. I came out mainly to see the light of the moon reflected from the meadowy flood. It is a pathway of light of sheeny ripples extending across the meadow toward the moon consisting of a myriad little bent & broken moons. I hear one faint peep from a bird on its roost. The clouds are travelling very fast into the south. I would not have believed the heavens could be cleared so soon. They consist of irregularly margined wide whitish bars *apparently* converging rendezvousing toward one point far in the south horizon. Like the columns of a host in the sky each being conducted by its own leader to one rendezvous in the southern sky – Such is the illusion – for we are deceived when we look up at this concave sphere as when we look on a plane map representing the convex globe. But what a grand incident of the night – though hardly a night passes without many such – that between the hours of 9 & 10 a battalion of downy clouds many miles in length & several in width were observed sailing noiselessly like a fleet from N to S over land and water at the height of half a dozen miles above the earth. Over woods & over villages they swept along – intercepting the light of the moon, & yet perchance no man observed them. Now they are all gone. The sky is left clear & cold – & but thinly peopled at this season – It is of a very light blue in all the horizon but darker in the zenith – darkest of all in the crevice between two clouds – It is particularly light in the western horizon. who knows but light is reflected from snow lying on the ground inland.

The water as I look at it in the north or NE is a very dark blue – the moon being on my right Afterwards crossing the railroad Bridge is a deep sea green. The evenings are now much shortened – suggesting that ours is to be henceforth a day-light life.

April 22, Thursday: In the afternoon [Henry Thoreau](#) walked up the Concord River on the east bank, inspecting flood conditions. At 10PM he saw the aurora.

SKY EVENT



AURORA BOREALIS



April 22. It still rains. The water is over the road at Flints Bridge – and, as I am told, has been for some time over the J. Miles road in the corner – & near the further stone Bridge. So that there is now only the Boston road open – unless we regard the walden road as coming from wayland and not from Lee's bridge. At 9 Am it was $5\frac{1}{2}$ inches higher than the E end of the Eastern truss horizontal part on the S side of the stone Bridge. Up to the top of the lowest stone step on the N side E end of R R bridge. Mr stacy thinks it was higher 30 years ago when a man horse & sleigh were washed off the Red Bridge road & lodged against a tree in the meadow. And Sam. Barrett thinks it was about 1 foot higher some 35 years ago. – Water a foot deep on Woods Bridge road. Abel Hunt saw a flock of geese [[Canada Goose](#) [Branta canadensis](#)] this morning This flood tempts men to build boats I saw two on the stocks this morning. It is pleasant work to see progressing.

P.M. — up river – on E side: It takes this day to clear up gradually – successive sun-showers still make it foul. But the sun feels very warm after the storm. This makes 5 stormy days. Sunday – M – T. W. Thursday. The water slightly agitated looks bright when the sun-shines. Saw 4 hawks [\[redacted\]](#) soaring high in the heavens over the swamp bridge brook – At first saw 3, said to myself there must be 4 & found the fourth. Glad are they no doubt to be out after being confined by the storm. I hear bees (?) humming near the brook, which reminded me of the telegraph harp. – I love to see the dull gravity even stolidity of the farmer opposed to the fluency of the lawyer or official person. The farmer sits silent not making any pretensions nor feeling any responsibility even to apprehend the other – while the judge or Governor talks glibly and with official despatch all lost on the farmer who minds it not but looks out for the main chance with his great inexpressive face & his 2 small eyes looking the first in the face & rolling a quid in the back part of his mouth. The lawyer is wise in deeds but the farmer who buys land puts the pertinent questions respecting the title. I observe the *Parmelia saxatilis* in many places now turned a pinkish red. The Yellow lily leaves appear no more advanced than when I first observed them. A strange dog accompanied us today – a hunting dog – gyrating about us at a great distance – beating every bush & barking at the birds. with great speed – gyrating his tail too all the while. I thought of what Gilpin says, that he sailed & steered by means of his tail – Sat under Potter's oak, the ground thickly strewn with broken acorn

DOG

shells & cups & twigs—the short close nibble sward of last year. Our dog sends off a partridge [**Ruffed Grouse** ■ **Bonasa umbellus**] with a whirl far across the open field & the river like a winged bullet— From Cliffs see much snow on the mts. The Pine on Lee's shore of the Pond seen against the light water this cloudy weather—from part way down the cliff is an agreeable object to me. When **the** outline & texture of white pine is thus seen against the water or the sky it is an affecting sight. The shadow of the cliff on Conantum in the semi-sunshine with indistinct edge & a reddish tinge from bushes here & there!

I want things to be incredible—too good to appear true. C. says “after you have been to the P.O. once you are dammed.”— but I answer that it depends somewhat on whether you get a letter or not. If you would be wise learn science & then forget it.¹³⁶

A boat on the river—on the white surface looks black—& the boatman like Charon. I see swarms of gnats in the air. What is that grass with a yellow blossom which I find now on the cliff—? *Carex marginata* (?) Early Sedge—the earliest grass that flowers. It is the contrast between sunshine & storm that is most pleasing— the gleams of sunshine in the midst of the storm are the most memorable. Saw that winkle-like fungus **fresh & green** covering an oak stump today with concentric marks—spirally arranged sometimes in a circle. very handsome I love this apparent exuberance of nature.

The maples in the side swamp near well meadow are arranged nearly in a circle in the water. This strange dog has good habits for a companion he keeps so distant— He never trusts himself near us though he accompanies us for miles. On the most retired the wildest & craggiest hill side you will find some old road by which the teamster carted off the wood— It is pleasant some times looking 30 or 40 rods into an open wood where the trunks of the trees are plainly seen & patches of soft light on the ground. The hylas peep now in full chorus, but are silent on my side of the pond. The water at 6 Pm is 1½ inches higher than in the morning, *i.e.* 7 inches above the iron truss. The strain of the Red wing [**Red-winged Blackbird** ■ **Agelaius phoeniceus**] on the willow spray over the water to-night is liquid bubbling—watery—almost like a tinkling fountain in perfect harmony with the meadow— It oozes, trickles, tinkles, bubbles from his throat. **bob-y-lee-e-e** & then its shrill fine whistle.

The villagers walk the streets & talk of the great rise of waters.

At 10 Pm the northern lights are flashing – like some grain sown broadcast in the sky. I hear the hylas peep on the meadow as I stand at the door.

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AURORA

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SKY EVENT



AURORA BOREALIS



136. Bradley P. Dean says that **Henry Thoreau** combined this with a reference to MARK 8:36 in the construction of his early lecture “WHAT SHALL IT PROFIT” paragraph number 73:

[Paragraph 73] When our life ceases to be inward and private, conversation degenerates into mere gossip. I rarely meet a man who can tell me any news which he has not read in a newspaper, and for the most part the only difference between me and my fellow is that he has seen the paper and I have not. But the London Times is not one of the Muses. When a man's inward life fails he begins to go more constantly to the post office, and despatches couriers to the other side of the globe; and so again he gains the whole world and loses his

**BRAD DEAN'S
COMMENTARY**



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BRAD DEAN’S
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AURORA

June 15, Tuesday: Henry Thoreau made an entry in his journal that he was later to copy into his early lecture “WHAT SHALL IT PROFIT” as:

[Paragraph 35] The aim of the laborer should be, not to get his living, to get “a good job,” but to perform well a certain work; and, even in a pecuniary sense, it would be economy for a town to pay its laborers so well that they would not feel that they were working for low ends, as for a livelihood merely, but for scientific, or even moral ends. Do not hire a man who does your work for money, but him who does it for love of it.



June 15: Tuesday. *Silene Antirrhina*, sleepy catch-fly, or snapdragon catch-fly, the ordinarily curled-up petals scarcely noticeable at the end of the large oval calyx. Gray says opening only by night or cloudy weather. Bigelow says probably nocturnal, for he never found it expanded by day. (I found it June 16th at 6 A.M. expanded, two of its flowers, - and they retrained so for some hours, in my chamber.) By railroad near Badger’s. Yesterday we smelt the sea strongly; the sea breeze alone made the day tolerable. This morning, a shower! The robin only sings the louder for it. He is inclined to sing in foul weather.

To Clematis Brook, 1.30 P. M.

Very warm. Now for a thin coat. This melting weather makes a stage in the year. The crickets creak louder and more steadily; the bullfrogs croak in earnest. The drouth begins. The dry z-ing of the locust is heard. The potatoes are of that height to stand up at night. Bathing cannot be omitted. The conversation Of all boys in the streets is whether they will or not or who will go in a-swimming, and how they will not tell their parents. You lie with open windows and hear the sounds in the streets.

The seringo sings now at noon on a post. has a light streak over eye.

The autumnal dandelion (*Leontodon*, or *Apargia*). *Erigeon integrifolius* of Bigelow (*strigosus*, i. e. narrowleaved daisy fleabane, of Gray) very common, like a white aster.

I will note such birds as I observe in this walk, beginning on the railroad causeway in middle of this hot clay. The chuckling warble of martins heard over the meadow, from a village box. The lark. The fields are blued with blue-eyed grass, - a slaty blue. The epilobium shows some color in its spikes.

How rapidly new flowers unfold! as if Nature would get through her work too soon. One has as much as he can do to observe how flowers successively unfold. It is a flowery revolution, to which but few attend. Hardly too much attention can be bestowed on flowers. We follow, we march after, the highest color; that is our flag, our standard, our “color.” Flowers were made to be seen, not overlooked. Their bright colors imply eyes, spectators. There have been many flower men who have rambled the world over to see them. The flowers robbed from an Egyptian traveller were at length carefully boxed up and forwarded to Linnaeus, the man of flowers. The common, early cultivated red roses are certainly very handsome, so rich a color and so full of blossoms; you see why even blunderers have introduced them into their gardens.

Ascending to pigeon-place plain, the reflection of the heat from the dead pine-needles and the boughs strewn about, combined with the dry, suffocating scent, is oppressive and reminds me of the first settlers of Concord. The oven-bird, chewink, pine warbler (?), thrasher, swallows on tire wire, cuckoo, phoebe, redeye, robin, veery. The maple-leaved viburnum is opening with a purplish tinge. Wood thrush.

Is not that the *Primus obovala*, which I find in fruit, a mere shrub, in Laurel Glen, with oval fruit, and lone, pedicels in a raceme? And have I not mistaken the *P. Virginiana*, or northern red cherry, for this? *Vide Virginiana* and also vide the *P. depressa*. Golden and coppery reflections from a yellow dor-bug’s coat of mail in the water. Is it a yellowbird or myrtle-bird? Huckleberry-bird. Walden is two inches above my last mark. It must be four or five feet, at least, higher than when I sounded it. Men are inclined to be amphibious, to sympathize with fishes, now. I desire to get wet and saturated with water. The North River, Assabet, by the old

BIGELOW

BIGELOW



stone bridge, affords the best bathing-place I think of, -a pure sandy, uneven bottom, -with a swift current, a grassy bank, and overhanging maples, with transparent water, deep enough, where you can see every fish in it. Though you stand still, you feel the rippling current about you.

First locust. The *pea-wai*.

There is considerable pollen on the pond; more than last year, notwithstanding that all the white pines near the pond are gone and there: are very few pitch. It must all come from the pitch pine, whose sterile blossoms are now dry and empty, for it is earlier than the white pine. Probably I have never observed it in the river because it is carried away by the current. The umbelled pyrola is just ready to bloom.

Young robins, dark-speckled, and the pigeon woodpecker flies up from the ground and darts away. I forget that there are lichens at this season.

The farmhouses under their shady trees (Baker's) look as if the inhabitants were taking their siesta at this hour. I pass it [sic] in the rear, through the open pitch pine wood. Why does work go forward now? No scouring of tubs or cans now. The cat and all are gone to sleep, preparing for an early tea, excepting the indefatigable, never-resting hoers in the corn-field, who have carried a jug of molasses and water to the field and will wring their shirts to-night. I shall ere long hear the horn blow for their early tea. The wife or the hired Irishwoman steps to the door and blows the long tin horn, a cheering sound to the laborers in the field.

The motive of the laborer should be not to get his living, to get a good job, but to perform well a certain work. A town must pay its engineers so well that they shall not feel that they are working for low ends, as for a livelihood merely, but for scientific ends. Do not hire a man who does your work for money, but him who does it for love, and pay him well.

On Mt. Misery, panting with heat, looking down the river. The haze an hour ago reached to Wachusett; now it obscures it. Methinks there is a male and female shore to the river, one abrupt, the other flat and meadowy. Have not all streams this contrast more or less, on the one hand eating into the bank, on the other depositing their sediment? The year is in its manhood now. The very river looks warm, and there is none of that light celestial blue seen in far reaches in the spring. I see fields a mile distant reddened with sorrel. The very sight of distant water is refreshing, though a bluish steam appears to rest on it. Catbird. The waxwork is in blossom and groves [of] hickories on the south of Mt. Misery.

How refreshing the sound of the smallest waterfall in hot [weather]! I sit by that on Clematis Brook and listen to its music. The very sight of this half-stagnant pond-hole, drying up and leaving bare mud, with the pollywogs and turtles making off in it, is agreeable and encouraging to behold, as if it contained the seeds of life, the liquor rather, boiled down. The foulest eater will bubble purely. They speak to our blood, even these stagnant, slimy pools. It, too, no doubt, has its falls nobler than Montmorenci, grander than Niagara, in the course of its circulations. Here is the primitive force of Egypt and the Nile, where the lotus grows.

Some geraniums are quite rose-colored, others pale purplish-blue, others whitish. The blossom of the *Lentago* is rather sweet smelling. *Orobanch uniflora*, single-flowered broom-rape (Bigelow), [or] *Aphyllon uniflorum*, one-flowered cancer-root (Gray), grows by this brook-side, - a naked, low, bluish-white flower, even reminding you of the tobacco-pipe. Cattle walk along in a brook or ditch now for coolness, lashing their tails, and browse the edges; or they stand concealed for shade amid thick bushes. How perfectly acquainted they are with man, and never run from him! Thorn bushes appear to be just out of blossom. I have not observed them well. Woodchucks and squirrels are seal and heard in a walk. How much of a tortoise is shell! But little is gone with its spirit. It is well cleaned out, I trust. It is emptied of the reptile. It is not its exuviae.

I hear the scream of a great hawk, sailing with a ragged wing against the high wood-side, apparently to scare his prey and so detect it, -shrill, harsh, fitted to excite terror in sparrows and to issue from his split and curved bill. I see his open bill the while against the sky. Spit with force from his mouth with an undulatory quaver imparted to it from his wings or motion as he flies.¹³⁸ A hawk's ragged wing will grow whole again, but so will not a poet's. By half past five, robins more than before, crows, of course, and jays. Dogsbane is just ready to open. Swallows. It is pleasant walking through the June-grass (in Pleasant Meadow), so thin and offering but little obstruction. The nighthawk squeaks and booms. The *Veratrum virile* top is now a handsome green cluster, two feet by ten inches.

Here also, at Well Meadow Head, I see the fringed purple orchis, unexpectedly beautiful, though a pale lilac purple, -a large spike of purple flowers. I find two, -the grandiflora of Bigelow and fimbriata of Gray. Bigelow thinks it the most beautiful of all the orchises. I am not prepared to say it is the most beautiful wild flower I have found this year. Why does it grow there only, far in a swamp, remote from public view? It is somewhat fragrant; reminding me of the lady's-slipper.

Is it not significant that some rare and delicate and beautiful flowers should be found only in unfrequented wild swamps? There is the mould in which the orchis grows. Yet I am not sure but this is a fault in the flower. It is not quite perfect in all its parts. A beautiful flower must be simple, not spiked. It must have a fair stem and leaves. This stem is rather naked, and the leaves are for shade and moisture. It is fairest seen rising from amid brakes and hellebore, its lower part or rather naked stem concealed. Where the most beautiful wild-flowers grow, there man's spirit is fed, and poets grow. It cannot be high-colored, growing in the shade. Nature has taken no pains to exhibit [it], and few that bloom are ever seen by mortal eyes. The most striking and handsome large wild-flower of the year thus far that I have seen. Disturbed a company of tree-toads amid the bushes. They

CAT

BIGELOW

BIGELOW



ASTRONOMY

ASTRONOMY

seemed to bewilder the passer by their croaking; when he went toward one, he was silent, and another sounded on the other side. The hickory leaves are fragrant as I brush past them. Quite a feast of strawberries on Fair Haven, -the upland strawberry. The largest. and sweetest on sand. The *first fruit*. The night-warbler. There are few really cold springs. I go out of my way to go by the Boiling Spring. How few men can be believed when they say the spring is cold! "There is one cold as the coldest well water. What a treasure is such a spring! Who *divined* it? The systoles are all closed. Is it because of the heat, and will they be open in the morning? C. found common hound's-tongue (*Cynoglossum officinale*) by railroad.

8 PM - On river.

No moon. A deafening sound from the toads, and intermittingly from bullfrogs. What I have thought to be frogs prove to be toads, sitting by thousands along the shore and trilling short and loud, - not so long a quaver as in the spring, - and I have not heard them in those pools, now, indeed, mostly dried up, where I heard them in the spring. (I do not know what to think of my midsummer frog now.) The bullfrogs are very loud, of various degrees of baseness and sonorousness, answering each other across the river with two or three grunting croaks. They are not nearly so numerous as the toads.

VENUS

It is candle-light. The fishes leap. The meadows sparkle with the coppery light of fireflies. [The evening star](#), multiplied by undulating water, is like bright sparks of fire continually ascending.¹³⁹ The reflections of the trees are grandly indistinct. There is a low mist slightly enlarging the river, through which the arches of the stone bridge are just visible, as a vision. The mist is singularly bounded, collected here, while there is none there; close up to the bridge on one side and none on the other, depending apparently on currents of air. A dew in the air it is, which in time will wet you through. See stars reflected in the bottom of our boat, it being a quarter full of water. There is a low crescent of northern light and shooting stars from time to time. (We go only from Channing's to the ash above the railroad.) I paddle with a bough, the Nile boatman's oar, which is rightly pliant, and you do not labor much. Some dogs bay. A sultry night.

September: The periodic [comet Biela](#), which had an orbital period of 6 years and 9 months but had appeared split apart into two pieces in January 1846, made another appearance. By this time the two halves had moved apart, one part slightly ahead of the other. (It would go quite to pieces during its whip around the sun in this month and this particular comet would not be again detected, upon its anticipated orbital periods in 1859 and 1866.)

ASTRONOMY

While visiting the Reverend Theodore Hamberg in [Hong Kong](#), [Issachar J. Roberts](#) 罗孝全 came across some documents about the Taiping Rebellion that had broken out in [Kwangsi](#) and for the first time learned that its leader was a person he had met and instructed, [Hung Hsiu Ch'üan](#) 洪秀全. Well aware that, back home, his [Baptist](#) missionary board was ready to dismiss him with "his usefulness to the Christian cause ... seriously questioned," this opportunistic missionary began to dream a grand redemption:

138. William M. White's version of [Thoreau](#)'s journal entry is:

*I hear the scream of a great hawk,
Sailing with a ragged wing against the high wood-side,
Apparently to scare his prey and so detect it,—
Shrill, harsh,
Fitted to excite terror in sparrows
And to issue from his split and curved bill.*

*I see his open bill the while against the sky.
Spit with force from his mouth
With an undulatory quaver
Imparted to it from his wings or motion
As he flies.*

ASTRONOMY

ASTRONOMY

I have hitherto taken little or no interest in the matter, but henceforward it will be otherwise.... The chief, having been already taught by the missionary, will, I presume, be accessible and teachable, however high his position in the state, which has not been the case hitherto with other high functionaries in China. In this way ... he will learn the truth fully as it is in Jesus, and then co-operating with the missionary in communicating the same to his people....



I will have millions of stars in my crown!

1853

There were two comets during this year. The 1st passed only 0.08 astronomical units from Earth. The 2d became rather bright while it was near Sol.¹⁴⁰

SKY EVENT

139. William M. White's version of this portion of the journal entry is:

*It is candle-light.
The fishes leap.
The meadows sparkle
With the coppery light of fireflies.*

*The evening star,
Multiplied by undulating water;
Is like bright sparks of fire
Continually ascending.*

VENUS



ASTRONOMY

ASTRONOMY

140. "COMET KLINKERFUES, (C/1853 L1=1853 III). Visible to the unaided eye from early Aug. through early Oct., T=1853 September 2. During early August situated in southernmost Ursa Major in the evening sky, magnitude about 5. Comet moved slowly to the southeast, gradually entering the twilight. Already on August 13 about 3rd or 4th magnitude. By the 19th reported as bright as 2nd magnitude with a tail several degrees long. On 26th, about 0 magnitude with a 10 degree tail while located within the evening twilight in eastern Leo. During the last days of August and the first week of September, visible telescopically in daylight, head at least -1 magnitude. Comet moved south of the Sun to become a morning object for the Southern Hemisphere. In mid September, when situated in Hydra, of 2nd magnitude with a 5 degree tail. Comet faded rapidly and was lost to the unaided eye before mid-Oct.."

ASTRONOMY

ASTRONOMY

[Benjamin Peirce](#), Perkins Professor of Astronomy and Mathematics at [Harvard College](#), became the president of the American Academy of Arts and Sciences.

HARVARD OBSERVATORY

The 6th and final volume of [Richard Hildreth](#)'s HISTORY OF THE UNITED STATES OF AMERICA, which had begun publication in 1849. Also, finally, his THEORY OF POLITICS. Hildreth was one of the initial American historians to experiment with a "science" of history, through attempting to present not merely an edifying story with a patriotic moral but instead the state of affairs "exactly as it was." He was in disagreement with the Reverend Professor Francis Bowen, who had written discouragingly in an 1851 review, "it is impossible to write history without seeking, either avowedly or stealthily, or unawares, to verify some hypothesis, or establish some theory, which furnishes a reason and guide for the selection and arrangement of materials."



An attempt to appoint Bowen as McLean Professor of History was blocked when some state office-holders who had been made members of the [Harvard](#) Board of Overseers, ex-officio, took offense at the honest plainness of his political agenda.



After [Professor Louis Agassiz](#) savaged his assistant [Charles Frédéric Girard](#), the man had obtained a science job at the Smithsonian Institution, working for [Spencer Fullerton Baird](#). Professor Agassiz, outraged that any part of the scientific establishment would make any use of someone of whom he personally had blacklisted, continued relentlessly to pursue his former assistant:

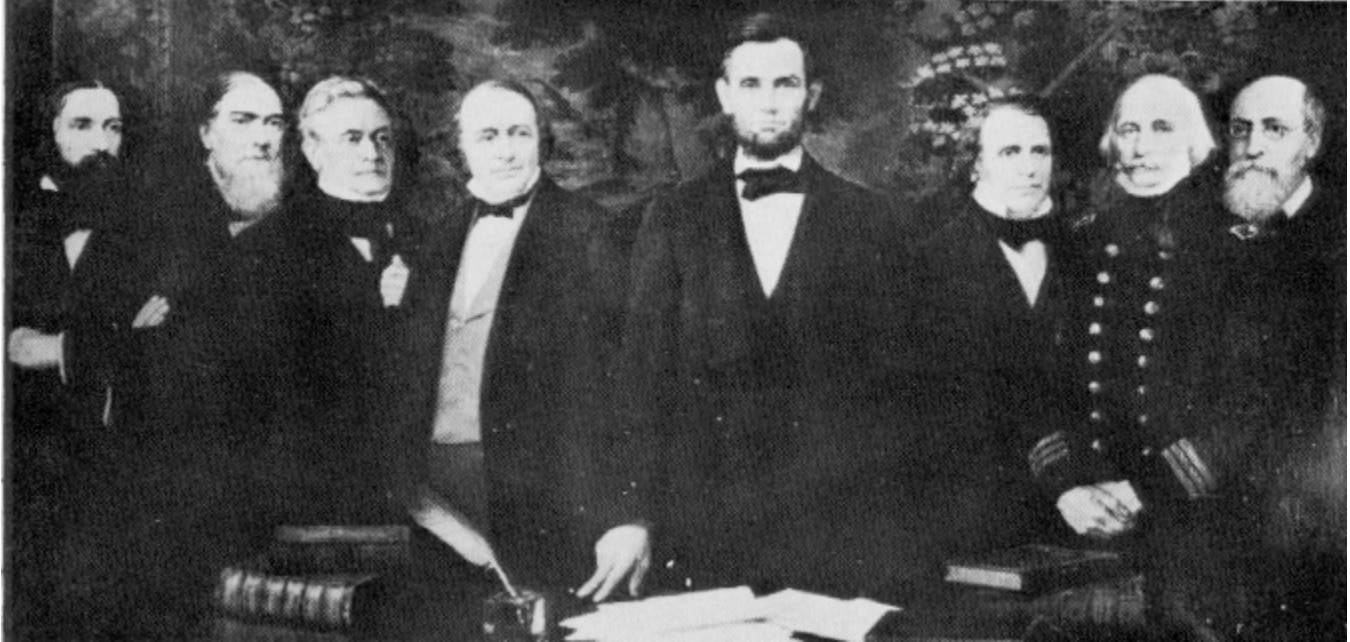
If you had been willing to listen to my advise [sic] before, you should have known that Girard, though capable of sustained work and endowed with considerable ability in distinguishing the peculiarities of animals, has no judgement, and is utterly unable to trace original researches without supervision. Moreover he is as obstinate as a mule, if contradicted, which makes it necessary that he should be led with a high hand and kept in an entirely subordinate position. Now this supervision of his work you have not made; you have not tested the value of the characters upon which he has based his generic and specific distinctions. I recognize his hand both in the style of the language used, and in the scientific character of the work. In the hurry of your many engagements you have entrusted to him a task to which he is not equal; and there goes forward from the Smithsonian Instit. a production which in quality is far inferior to what is done elsewhere, though by the quantity of the materials you had the means of surpassing every work of that kind.

[Girard](#) collected specimens in Maine, Massachusetts, and South Carolina. [Baird](#) created the CATALOG OF NORTH AMERICAN REPTILES with Girard's assistance. Robert Kennicott, Girard, and other young naturalists were urged to form an informal group, known as the "Megatheria."

It was in approximately this time period that [Professor Agassiz](#) of [Harvard College](#) began to organize the scientific pressure group of schemers and administrators he referred to as his "Lazzaroni."¹⁴¹ The work of this group would continue behind the scenes until the creation, in the wee small hours of the 37th Congress, on March 3, 1863, after a decade of plotting and conspiring, of a new disciplinary "jury" (the professor's term) to be known as the National Academy of Sciences. Here they are depicted attempting to acquire respectability

141. The Lazzaroni of [Naples](#) are gangs of pickpockets and con artists who work the street crowds for what they can get. (One of them once tried to sell me a Rolex® for like \$40, while I was waiting for a boat at the docks, but I pointed out to the man that my wristwatch had an Indiglo® dial which his Rolex® lacked, that my wristwatch had a day-of-the-week indicator which was practically all I ever looked at on the dial which his Rolex® lacked, that my wristwatch had also cost me about \$40 on sale at K-Mart when it had been new a number of years before, and besides **the brand name of my wristwatch also ended in "-ex"!** I suggested to this gent "Nevertheless, I will be willing to trade you, even-Steven!" –Meanwhile, I was keeping my arm pressed firmly against my wad of cash in the side pocket of my pants under my comb and handkerchief, just in case he was working as a team.)

by rubbing against a respectable person (or maybe they're just trying to distract him and pick his pocket):



At some point during this year Professor [Agassiz](#) wrote from Cambridge to [Henry Thoreau](#) among others:

To: HDT
From: Louis Agassiz
Date: [1853]

{No MS — printed copy — Thoreau's copy of this form is at Widener Library}

DEAR SIR,—

Having been engaged for several years in the preparation of a Natural History of the Fishes of the United States, I wish, before beginning the printing of my work, to collect as extensive materials as possible, respecting the geographical distribution of these animals. It has occurred to me, that by means of a circular containing directions for collecting fishes I might obtain the information required. I should, indeed, like to secure separate collections of our fishes from every bay and inlet along the coast, and from every stream, river, creek, lake, and pond upon the mainland, throughout the whole country, and am satisfied that such collections would furnish invaluable information respecting the geographical distribution of our aquatic animals. I would thank you for any assistance and contribution you can furnish from your quarter of the country, and duly acknowledge it in my work; and since I extend my investigations to all the branches of Natural History, any specimens besides fishes, which may be obtained, would be equally acceptable, including geological specimens and fossil remains. In return I would propose exchanges of other specimens if desired, or reciprocate the favor in any other way in my power, and pay the expenses incurred in making collections for me. Specimens from foreign countries are also solicited, especially when their origin is satisfactorily ascertained. Any person into whose hands this circular may come, feeling inclined to correspond with me upon these subjects, is requested to address me under the following direction:—

L. AGASSIZ,
Professor of Zoology and Geology in the Lawrence Scientific School, at CAM-
 BRIDGE, MASS.

[We may suppose that, in the above, in the original printing, the second “o” of the word Zoology would have had an umlaut over it.]

[include Directions?]

January 21, Friday: It was reported in the Liberator that in a spiritualist seance, a “magnetized woman” had been asked to send the spirit of Nathaniel Peabody Rogers from “beyond the veil,” and then those attending the seance in the dark heard the sound of a horn. One of those attending the seance, [Henry C. Wright](#), informed the others that once upon a time he had been with Rogers in the White Mountains, when a hotel keeper had sounded a horn in precisely the same manner!

SPIRITUALISM



January 21st: A fine still warm moonlight evening – we have had 1 or 2 already moon not yet full. To the woods by the deep cut at 9 o’clock. The blueness of the sky at night is an everlasting surprise to me – suggesting the constant presence & prevalence of light in the firmament – the color it wears by day – that we see through the veil of night to the constant blue as by day. The night is not black – when the air is clear – but blue still as by day – the great ocean of light and ether is unaffected by our partial night Night is not universal. At midnight I see into the universal day. Walking at midnight unless it is cloudy still the blue sky o’er arches as by day.

I am somewhat oppressed & saddened by the sameness & apparent poverty of the heavens – that these irregular & few geometrical figures which the constellations make are no other than those seen by the Chaldaean shepherds – I pine for a new World in the heavens as well as on the earth – And though it is some consolation to hear of the wilderness of stars & systems invisible to the naked eye – yet the sky does not make that impression of variety & wildness that even the forest does – as it ought It makes an impression rather of simplicity & and unchangeableness as of eternal laws – This being the same constellation which the shepherds saw & obedient still to the same law – It does not affect me as that unhandsselled wilderness which the forest is – I seem to see it pierced with visual rays from a thousand observatories – It is more the domain of science than of poetry. But it is the stars as not known to science that I would know – the stars which the lonely traveller knows. The chaldaean shepherd saw not the same stars which I see, and I am elevated in the least toward the heavens I do not accept their classification of them. I am not to be distracted by the names which they have imposed. The sun which I know is not Apollo – nor is the evening star [Venus](#). The heavens shall be as new at least as the world is new. This classification of the stars is old and musty – it is as if a mildew had taken place in the heavens – as if the stars so closely packed had heated & moulded there. If they appear fixed, it is because that hitherto men have been thus necessitated to see them – I see not merely old but new testaments in the skies. Do not I stand as near the stars as the Chaldaean shepherds? The heavens commonly look as dry & meagre as our astronomies are – mere troops as the latter are catalogues of stars – The milky way yields no milk. A few good anecdotes is our science – with a few imposing facts respecting distance & size – & little or nothing about the stars as they concern man – teaching how he may survey a country or sail a ship – & not how he may steer his life – Astrology contained the germ of a higher truth than this – It may happen that the stars are more significant & truly celestial to the teamster than to the astronomer – Nobody sees the stars now – they study astronomy at the district school – & learn that the sun is 195 millions distant & the like – a statement which never made any impression on me because I never walked it and which I cannot be said to believe – But the sun shines nevertheless. Though observatories are multiplied the heavens receive very little attention. The naked eye may easily see farther than the armed. It depends on who looks through it – No superior telescope to this has been invented – In those big ones the recoil is equal to the force of the discharge. The poet’s eye in a fine frenzy rolling ranges from earth to heaven – but this the astronomer’s does not often do. It does not see far beyond the dome of Greenwich observatory. Compared with the visible phenomena of the heavens the anecdotes of science affect me as trivial & petty. Mans eye is the true star-finder – the comet-seeker. As I sat looking out the window the other evening just after dark I saw the lamp of a freight train – & nearly just over the train a bright star – which looked exactly like the former as if it belonged to a different part of the same train – It was difficult to realize that the one was a feeble oil lamp – the other a world.¹⁴²

VENUS

As I walk the RR causeway I am – disturbed by the sound of my steps on the frozen ground – I wish to hear



the silence of the night. I cannot walk with my ears covered – The silence is something positive & to be heard. I must stand still & listen with open ear far from the noises of the village that the night may make its impression on me – a fertile & eloquent silence. Sometimes the silence is merely negative an arid & barren waste in which I shudder – where no ambrosia grows. I must hear the whispering of a myriad voices. Silence alone is worthy to be heard. Silence is of various depth & fertility like soil. Now it is a mere Sahara where men perish of hunger & thirst – now a fertile bottom or prairie of the west. As I leave the village drawing nearer to the woods – I listen from time to time – to hear the hounds of Silence baying the moon – to know if they are on the track of any game – ¹⁴³ If there's no Diana in the night – what is it worth? I hark the Goddess Diana. The silence rings – it is musical & thrills me. A night in which the silence was audible – I hear the unspeakable. I easily read the moral of my dreams – Yesterday I was impressed with the rottenness of human relations – they appeared full of death & decay – & offended the nostrils – In the night I dreamed of delving amid the graves of the dead and soiled my fingers with their rank mould. It was **sanitarily** – **morally** – & physically true.

If night is the mere negation of day I hear nothing but my own steps in it – Death is with me & life far away – If the elements are not human – if the winds do not sing or sigh – as the stars twinkle – my life runs shallow – I measure the depth of my own being. I walk with vast alliances. I am the Allied powers The holy alliance – absorbing the European potentates. – I do not get much from this blue sky – these twinkling stars – & bright snow fields reflecting an almost rosaceous light. But when I enter the woods – I am fed by the variety – the forms of the trees above against the blue, with the stars seen through the pines like the lamps hung on them in an illumination – the somewhat indistinct and misty fineness of the pine tops – And the finely divided spray of the oaks &c – And the shadows of all these on the snow – The first shadow I came to I thought was a black place where the wood- choppers had had a fire – These myriad shadows checker the white ground & enhance the brightness of the enlightened portions. See the shadows of these young oaks – which have lost half their leaves – more beautiful than themselves like the shadow of a shandelier – & motionless as if they were fallen leaves on the snow – but shake the tree and all is in motion –

In this stillness & at this distance I hear the 9 o'clock bell in Bedford 5 miles off – which I might never hear in the village but here its music surmounts the village din – and has some- thing very sweet & noble & inspiring in it, associated in part with the hooting of owls.

Returning – I thought I heard the creaking of a wagon – just starting from Hubbards door – & rarely musical it sounded – It was the Telegraph harp. It began to sound but at one spot only. It is Very fitful – & only sounds when it is in the mood – You may go by 20 times both when the wind is high & when it is low – & let it blow which way it will – & yet hear no strain from it – but another time – at a particular spot you may hear a strain rising & swelling on the string – which may at last ripen to something glorious – The wire will perhaps labor long with it before it attains to melody.

Even the creaking of a wagon in a frosty night has music in it which allies it to the highest & purest strain of the muse –

I think it was Jan 20th that I saw that which I think an otter track in path under the Cliffs. no doubt it was A deep trail in the snow 6 or 7 inches wide & 2 or 3 deep in the middle, as if a log had been drawn along – similar to a muskrats only much larger – & the legs evidently short & the steps short sinking 3 or 4 inches deeper still as if it had waddled along It finally turned into my old tracks & went toward the river – & Fair Haven Pond One was killed there last spring.

Israel Rice tells of one shot within the year in a ditch near White Pond – prob. the same He says I saw an otter track Minot says his mother told him she had seen a deer come down the hill behind her house – where J. Moores now is & cross the road in front. – thinks it may have been 80 years ago. Otter are very rare here now – I have not heard of any killed hereabouts for 20 or 30 years till within 2 years – 2 or 3 of them. in Sudbury & at Fair Haven Pond.¹⁴⁴

January 31, Monday: [Henry Thoreau](#) quoted from “System of the Heavens as Revealed by Lord Rosse’s Telescopes” on pages 2-47 of Volume II of the NARRATIVE AND MISCELLANEOUS PAPERS of [Thomas De Quincey](#), which had just been published in Boston by the firm of Ticknor, Reed, and Fields:

NARRATIVE MISC. VOL. II

142. From the sheaf Thoreau collected under the heading “The Moon,” from which after Thoreau’s death either Ellery Channing or Sophia Thoreau extrapolated the [Atlantic Monthly](#) article “Night and Moonlight”:

As I sat looking out the window the other evening just after dark, I saw the lamp of a freight-train, and [^]*further along at the same height*, just over the train, a bright star which looked exactly like the former, as if it belonged to a different part of the same train. It was difficult to realize that the one was a feeble oil lamp, [^]*and* the other [^]*perhaps* a world.

ASTRONOMY

ASTRONOMY



January 31st: –Found an Ind. adze in the Bridle-Road at the brook just beyond Daniel Clark Jr’s house. A man is wise with the wisdom of his time only & ignorant with its ignorance– Observe how the greatest minds yield in some degree to the superstitions of their age.

[De Quincy](#) (whose pains to prove that was not Christ’s mission to teach men science though he **of course** (!) knew it all, – suggested the above–) says– “This downward direction of the eyes, however, must have been worse in former ages: because, else it never **could** have happened that, until Queen Ann’s days, nobody ever hinted in a book that there **was** such a thing, or **could** be such a thing, as the Aurora Borealis; and in fact, Halley

AURORA

143. William M. White’s version of the journal entry is:

*Silence alone is worthy to be heard.
Silence is of various depth and fertility,
Like soil.*

*Now it is a mere Sahara,
Where men perish of hunger and thirst,
Now a fertile bottom, or prairie,
Of the West.*

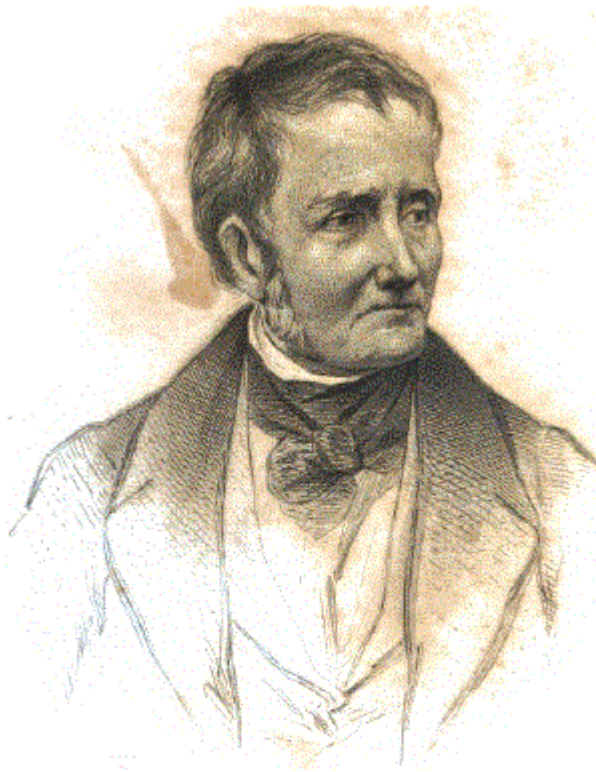
*As I leave the village,
Drawing nearer to the woods,
I listen from time to time
To hear the hounds of Silence baying the Moon,—
To know if they are on the track of any game.*

ASTRONOMY

ASTRONOMY

had the credit¹⁴⁵ of discovering it.”

SKY EVENT



*Very truly yours,
Thomas De Quincey.*

ATTITUDES ON DE QUINCEY

March 18, Friday: We now have a complete on-line source for the contents of the issue of Frederick Douglass' Paper for this date:

ON-LINE RESOURCE

144. The poet W.H. Auden has in 1962 brought forward a snippet from this day's entry as:

THE VIKING BOOK OF APHORISMS, A PERSONAL SELECTION BY W.H. AUDEN...

Pg	Topic	Aphorism Selected by Auden out of Thoreau
263	Science	It is the stars as not known to science that I would know – the stars which the lonely traveller knows.

ASTRONOMY

ASTRONOMY



March 18: The season is so far advanced that the sun, every now and then promising to shine out through this rather warm rain, lighting up transiently with a whiter light the dark day and my dark chamber, affects me as I have not been affected for a long time. I must go forth.

P.M. — To Conantum.

I find it unexpectedly mild. It appears to be clearing up but will be wet underfoot.

Now, then, spring is beginning again in earnest after this short check. Is it not always thus? Is there not always an early promise of spring, something answering to the Indian summer, which succeeds the summer, so an Indian or false spring preceding the true spring, — first false promise which merely excites our expectations to disappoint them, followed by a short return of winter? Yet all things appear to have made progress, even during these wintry days, for I cannot believe that they have thus instantaneously taken a start. I no sooner step out of the house than I hear the bluebirds in the air, and far and near, everywhere except in the woods, throughout the town you may hear them, —the blue curls of their warblings,— harbingers of serene and warm weather, little azure rills of melody trickling here and there from out the air, their short warble trilled in the air reminding of so many corkscrews assailing and thawing the torpid mass of winter, assisting the ice and snow to melt and the streams to flow. Everywhere also, all over the town, within an hour or two have come out little black two-winged gnats with plumed or fuzzy shoulders. When I catch one in my hands, it looks like [a] bit of black silk ravelling. They have suddenly come forth everywhere.

How eagerly the birds of passage penetrate the northern ice, watching for a crack by which to enter! Forthwith the swift ducks will be seen winging their way along the rivers and up the coast. They watch the weather more sedulously than the teamster. All nature is thus forward to move with the revolution of the seasons. Now for some days the birds have been ready by myriads, a flight or two south, to invade our latitudes and, with this mild and serener weather, resume their flight.

Bells and the lowing of cows have acquired I know not what new melody in this air, for a change has come over all things, as well as our spirits. They sound more limpid, as, in this sun just bursting forth, the drops of water on the sprays, are prismatic. The geiropodium has bleached all white.

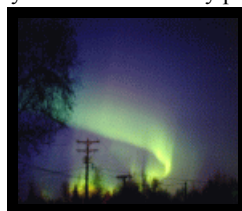
I stand still now and listen if I may hear the note of any new bird, for the sound of my steps hinders, and there are so few sounds at this season in a still afternoon like this that you are pretty sure to detect one within a considerable distance. Hark! Did I not hear the note of some bird then? Methinks it could not have been my own breathing through my nose. No, there it is again, —a robin; and we have put the winter so much further behind us. What mate does he call to in these deserted fields? It is, as it were, a scared note as he whisks by, followed by the familiar but still anxious *toot, toot, toot*. He does not sing as yet. There were one or two more fine bird-like tinkling sounds I could not trace home, not to be referred to my breathing.

It is decidedly clearing rip. At Conantum Cliff the columbines have started and the saxifrage even, the former as conspicuously as any plant, particularly any on dry ground. Both these grow there in high and dry chinks in the face of the cliff, where no soil appears, and the sunnier the exposure the more advanced. Even if a fallen fragment of the rock is so placed as to reflect the heat upon it, it has the start of its neighbors, These plants waste not a day, not a moment, suitable to their development. I pluck dry sprigs of pennyroyal, which I love to put in my pocket, for it scents me thoroughly and reminds me of garrets full of herbs.

With regard to my seringo-bird (and others), I think that my good genius withheld his name that I might learn his character.

I came forth expecting to hear new birds, and I am not disappointed. We know well what to count upon. Their coming is more sure than the arrival of the sailing and steaming packets. Almost while I listen for this purpose, I hear the *chuck, chuck* of a blackbird in the sky, whom I cannot detect. So small an object is lost in the wide expanse of the heavens, though no obstacle intervenes. When your eye has detected it, you can follow it well enough, but it is difficult to bring your sight to bear on it, as to direct a telescope to a particular star. How many hawks may fly undetected, yet within sight, above our heads! And there's the great gull I came to see, already fishing in front of Bittern Cliff. Now he stoops to the water for his prey, but sluggishly, methinks. He requires a high and perhaps a head wind to make his motions graceful. I see no mate. He must have come up, methinks, before the storm was over, unless he started when I did. I believe it is only an easterly wind or storm brings him up.

145. [De Quincey](#) is of course mistaken, since the aurora borealis had already been seen, and named as such, by [Galileo Galilei](#), before Edmond Halley fils was even a gleam in the eye of Edmond Halley pere.



AURORA BOREALIS



The ice in Fair Haven is more than half melted, and now the woods beyond the pond, reflected in its serene water where there has been opaque ice so long, affect me as they perhaps will not again this year.¹⁴⁶ The oaks have not yet lost their leaves. The thistles, which keep their heads so low they do not feel the wind, show their green faces everywhere. It grows more and more fair. Yesterday at this hour it was more raw and blustering than the past winter; to-day it seems more mild and balmy than summer. I have rarely known a greater contrast. There is a little cap of dark and angry cloud on Wachusett, not so wide as the mountain's base, while all the rest of the horizon there is clear.

Several times I hear and see blackbirds flying north singly, high overhead, chucking as if to find their mates, migrating; or are they even now getting near their own breeding-place? Perchance these are blackbirds that were hatched here – that know me! I saw a silent sparrow lurking amid the hazels and other shrubs by a wall and picking worms or what-not, — brownish gray with a forked tail, two triangular black spots on the breast, and black stripes lengthwise there, altogether a gray, much striped bird, two brownish stripes with a lighter-colored one on the center of the head. Soon after I heard a song sparrow distinctly. Could it have been this?¹⁴⁷ I think not.

The bluebird and song sparrow sing immediately on their arrival, and hence deserve to enjoy some prominence. They give expression to the joy which the season inspires. But the robin and blackbird only *peep* and *chuck* at first, commonly, and the lark is silent and flitting. The bluebird at once fills the air with his sweet warbling, and the song sparrow from the top of a rail pours forth his most joyous strain. Both express their delight at the weather which permits them to return to their favorite haunts. They are the more welcome to man for it.

Hearing a faint quack, I looked up and saw two apparently dusky ducks winging their swift way northward over the course of the river. Channing says he saw some large white-breasted ducks to-day, and also a frog. I have seen dead frogs, as if killed while dormant.

The sun is now declining, with a warm and bright light on all things, a light which answers to the late afterglow of the year, when, in the fall, wrapping his cloak closer about him, the traveller goes home at night to prepare for winter. This the foreglow of the year, when the walker goes home at eve to dream of summer.

To-day first I smelled the earth.

July 8, Friday: Mary Keyes was born to Martha Prescott Keyes and [John Shepard Keyes](#).

Early in July we had another daughter Mary, born on the 8.th and Martha got up nicely from her confinement, and was soon able to enjoy the shorter drives with me—

J.S. KEYES AUTOBIOGRAPHY

On the Oregon Trail, some camping utensils, a powder horn, and fragments of clothing were discovered. In a pocket of the pantaloons there was a gold watch and key. To all appearances someone had been killed there, but no papers giving a clue to a name were to be discovered.

Commodore [Matthew Calbraith Perry](#)'s flagship USS *Mississippi* and its squadron of three accompanying ships appeared on the horizon, off [Edo Bay](#). That night the watch officer, Lieutenant John K. Duer, observed a puzzling sky object:

During the watch from midnight to 4 A.M. a very remarkable [meteor](#) was seen. It made its appearance in the south and west and illuminated the whole atmosphere. The spars, sails and hulls of the ships in company as well as our own reflected its glare as distinctly as though a blue light were burning from each at the same time. From the south and west about 15 degrees above the horizon it pursued a north-easterly course in a direct line for a long distance, when it fell gradually toward the sea and disappeared. Its shape was that of a large blue sphere with a red wedge-shaped tail, which it could be easily observed was formed of ignited particles, and resembled the sparks of a rocket as they appear upon its explosion.

146. The tapping of the woodpecker about this time.

147. Think now (March 24) it must have been the song sparrow. *Vide* Apr. 1st.



ASTRONOMY

ASTRONOMY

The black vessels would lie in Tokyo Bay, menacing and silent, for a period of time, and then suddenly the Commodore would open negotiations by giving representatives of the Emperor three days to deliver a letter to their supreme leader — or else.

US MILITARY INTERVENTIONS

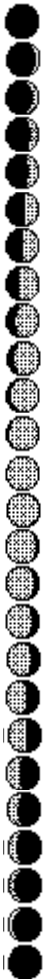
1854

There was a [comet](#) during this year, with an orbit similar to the one that had appeared in 1677.¹⁴⁸

SKY EVENT

148. "GREAT COMET, (C/1854 F1=1854 II). Period of naked eye visibility extended from Mar. 23 until mid-Apr., T=1854 March 24. Relatively short-lived object. Discovered in the morning twilight of March 23 as an object of zero to 1st magnitude. Located in southern Pegasus. Moved to conjunction with the Sun, passing well north of it on March 27, and entering the evening sky. At the very end of the month situated in Pisces, of 1st magnitude with a 5 degree tail. Traversed Aries during the first week of April, fading rapidly from 2nd to about 4th magnitude but tail still spanned up to 5 degrees. In mid April, while crossing southern Taurus, near the limit of naked eye visibility with a 1 degree tail."

In England, an English laborer accused of criminal actions during the full and new moons, Charles Hyde, defended himself in court by arguing that he was not responsible for acts of “lunacy,” that is, for acts caused not by himself but by the mandate of the heavens. The court was distinctly not impressed by this early version of what is now referred to as “the twinkie defense” and packed this defendant off to prison to protect him for the foreseeable future from the direct influence of the rays of the moon, but a writer named Robert Lewis Stevenson would be impressed enough to use his ingenious apology as the basis for a story, “Dr. Jekyll and Mr. Hyde.”



Phases of the Moon



The New Moon



The Waxing Crescent



The First Quarter



The Gibbous Moon



The Full Moon



The Gibbous Moon



The Last Quarter



The Waning Crescent

ASTRONOMY

ASTRONOMY

March 13, Monday: Documentation of the [international slave trade](#), per W.E. Burghardt Du Bois: "Message from the President ... communicating ... the correspondence between Mr. Schenck, United States Minister to Brazil, and the Secretary of State, in relation to the African slave trade." —SENATE EXECUTIVE DOCUMENT, 33 Cong. 1 sess. VIII. No. 47.

Besides purchasing a [telescope](#) for eight dollars (more than a week's total wages, order of magnitude approximately \$800 in today's greenbacks), [Henry Thoreau](#) stopped by the [Boston Society of Natural History](#)



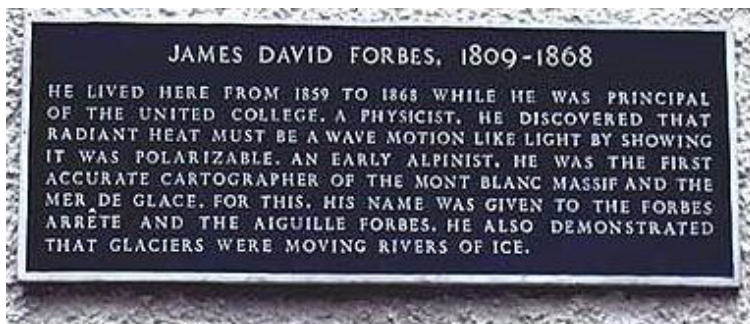
*Thoreau's Flute, Telescope and copy of
Wilson's Ornithology.*

*"I bought me a spy-glass some weeks since. I buy but few things,
and those not till long after I begin to want them, so that when I do get them I
am prepared to make a perfect use of them and extract their whole sweetness."
Page 3. Early Spring.*

and checked out:

— [James David Forbes](#) (1809-1868)'s TRAVELS THROUGH THE ALPS OF SAVOY
AND OTHER PARTS OF THE PENNINE CHAIN, WITH OBSERVATIONS ON THE PHENOMENA OF GLACIERS

(1843)



THE ALPS OF SAVOY, ETC.

and stopped by the [Harvard Library](#) and checked out:

— [Louis Agassiz](#)'s *ÉTUDES SUR LES GLACIERS* (Neuchâtel, aux frais de l'auteur, August 20, 1840, with atlas)

— [Edward Johnson](#)'s A HISTORY OF NEW-ENGLAND. FROM THE ENGLISH PLANTING IN THE YEERE 1628. UNTILL THE YEERE 1652: DECLARING THE FORM OF THEIR GOVERNMENT, CIVILL, MILITARY, AND ECCLESIASTIQUE: THEIR WARS WITH THE INDIANS, THEIR TROUBLES WITH THE GORTONISTS, AND OTHER HERETIQUES: THEIR MANNER OF GATHERING OF CHURCHES, THE COMMODITIES OF THE COUNTRY, AND DESCRIPTION OF THE PRINCIPALL TOWNS AND HAVENS... (London: Printed for Nath. Brooke ..., 1654)¹⁴⁹



— The Reverend Thomas Shepard's THE CLEAR SUNSHINE OF THE GOSPEL BREAKING OUT ON THE INDIANS OF NEW ENGLAND (1648)¹⁵⁰



Mar. 13th To Boston— C. says he saw skater insects today. [Harris](#) tells me that those gray insects within the little log forts under the bark of the dead Wht pine — which I found about a week ago — are Rhagium lineatum. Bought a telescope today for 8 dollars — Best military spyglass with 6 slides which shuts up to about same size, 15 dols & very powerful Saw the squares of achromatic glass from Paris which Clark-(e?) uses — 50-odd dols apiece the larger— It takes 2 together — one called the flint— These French glasses all one quality of glass. My glass tried by Clark & approved — only a part of the object glass available. Bring the edge of the diaphragm against middle of the light & your nail on object glass in line with these shows what is cut off— Sometimes may enlarge the hole in diaphragm— But if you do so you may have to enlarge the hole in diaphragm near small end — which must be exactly as large as the pencil of light there. As the diameter of the pencil is to the diameter of the available portion of the object glass so is the power — so many times it

149. The popular title of this work is WONDER-WORKING PROVIDENCE OF SION'S SAVIOR IN NEW ENGLAND. Thoreau would place his notes in his Indian Notebook #8.

150. The Reverend Shepard was a founder of Harvard College.

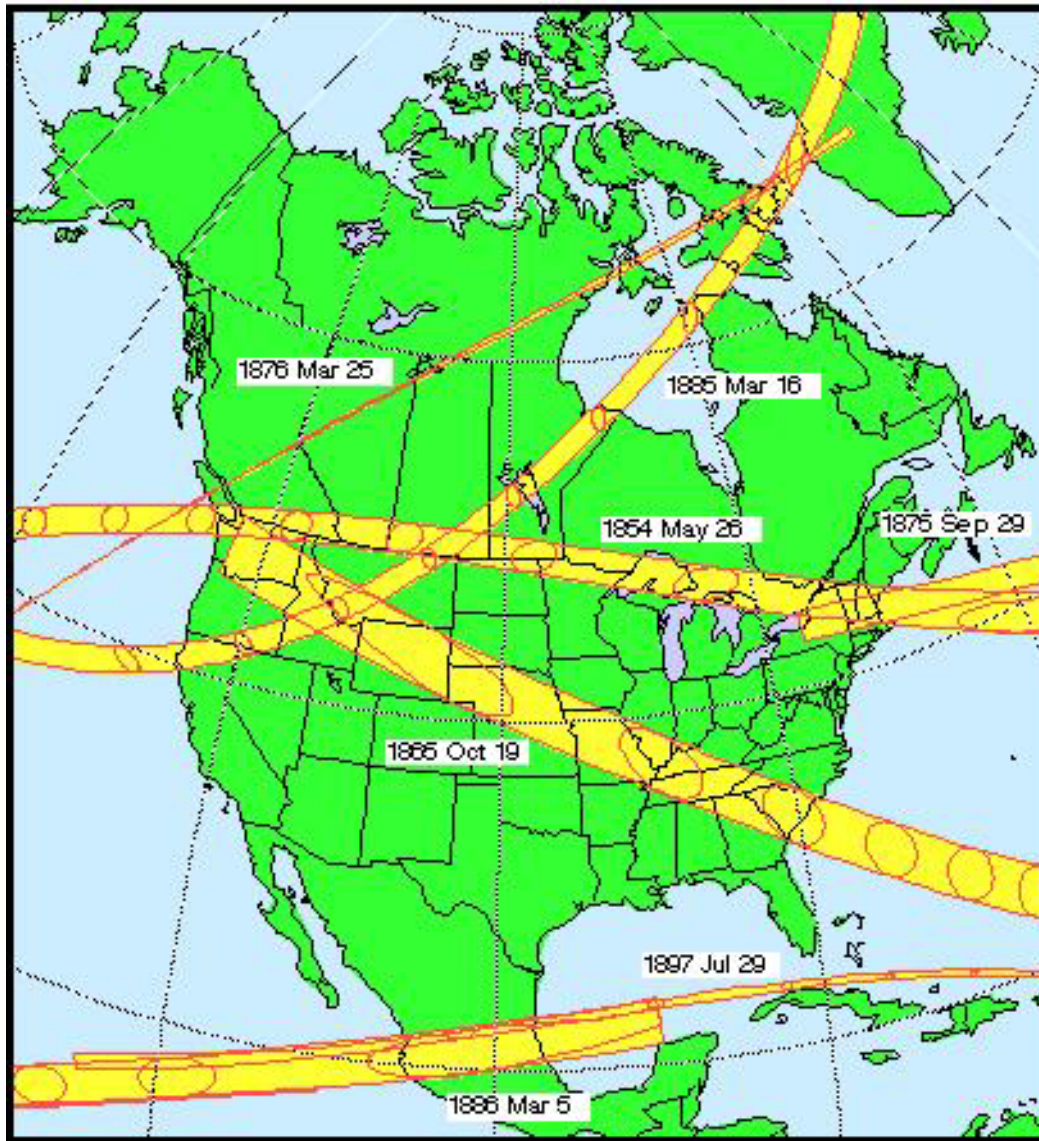
ASTRONOMY

ASTRONOMY

magnifies— A good glass because the form of the blurred object is the same on each side of the focus *i.e* shoved in or drawn out. C. was making a glass for Amherst Col.

May 26, Friday: An annular solar [eclipse](#) (#7298) was visible (local weather conditions permitting) in a path from Washington state along the Canadian border and across New England and Nova Scotia:

Annular Solar Eclipses: 1851 - 1900



ASTRONOMY

In Boston, the solar eclipse was precluded by clouds and rain. However, in Roxbury, Caroline Barrett White got a view and was able to mark down the totality as occurring precisely at 5:40 PM. In Cambridge, [Henry Wadsworth Longfellow](#) wrote in his journal that “Yesterday a fugitive slave was arrested in Boston! To-day there is an eclipse of the sun. ‘Hung be the heavens in black!’”

At 5:30 AM [Henry Thoreau](#) visited the climbing ivy, and in the afternoon he went to Walden Pond. Presumably he caught no glimpse of the eclipse through the clouds.

[Moncure Daniel Conway](#) heard the Reverend [Theodore Parker](#)'s incendiary oration at Faneuil Hall:

There is a means, and there is an end; liberty is the end, and sometimes peace is not the means toward it.



Hey, that's not bad, coming from a white man who believed his own Caucasian race to be uniquely humane, civilized, and progressive, never enslaved because able to conquer by use of the head as well as by use of the hand. (Yeah, that's just about a quote unquote, for the Reverend Parker besides being a warmonger was also a racist.) Let's have a war so that superior and inferior races can live together in harmony!

The lawyer Seth Webb, Jr. managed to persuade Judge Daniel Wells of Boston's Court of Common Pleas to issue to Boston's coroner, Charles Smith, a writ of personal replevin according to which US Marshal Watson Freeman was to surrender "the body of Anthony Burns." Freeman, however, refused to comply with this writ. Meanwhile, there were maneuvers to raise \$1,200 to purchase the escaped slave in order directly to manumit him.¹⁵¹

MANUMISSION

This Anthony Burns affair made Conway (among others) into an abolitionist, by forcing him to choose sides. As the industrialist Amos Lawrence of the Secret "Six" conspiracy commented,

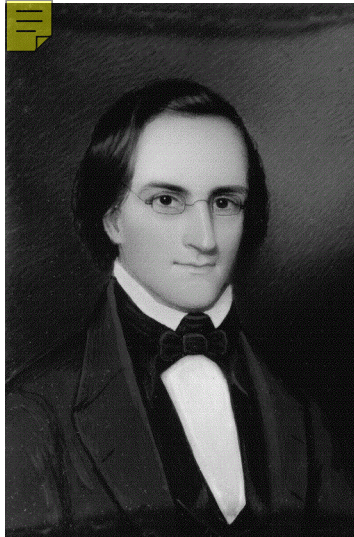
We went to bed one night old-fashioned, conservative, Compromise Union Whigs and waked up stark mad Abolitionists.

Bronson Alcott took the train from Boston for Worcester on a mission for the Boston Vigilance Committee. He was to attract the Reverend Thomas Wentworth Higginson, who had organized the guerrilla action of 1851 which had failed to rescue Thomas Simms (Sims), to head the Vigilance Committee and to take action in regard to the kidnapping of Burns.¹⁵²

151. It would have been at best problematic, for such a sale of Burns to the abolitionists for \$1,200 to have gone through. Under Massachusetts law, the sale of a slave within the Commonwealth would have been a criminal offense committed by the seller and punishable by a fine of \$1,000 plus ten years in prison. Even if Mr. Charles Francis Suttle were to carefully phrase the transaction as a [manumission](#) financed by others rather than as a financial transaction for gain, he very well knew that this would provide his enemies with a pretext for indefinite legal harassment — a pretext upon which in the utter absence of all good will they would be quite likely to act.

1855

[Benjamin Apthorp Gould](#) became the director of the Dudley Observatory at Albany, New York (until 1859).



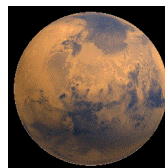
ASTRONOMY

David Alter described the spectra of hydrogen and other gases.

HISTORY OF OPTICS

1856

Walter De la Rue made an improved map of the surface features of [Mars](#).



ASTRONOMY

152. For the attempt at rescuing Anthony Burns, see the Reverend Thomas Wentworth Higginson's CHEERFUL YESTERDAYS (Boston: Houghton Mifflin, 1898).



ASTRONOMY

ASTRONOMY

Cornelius S. Cartée's and Alexander Keith Johnston's A SCHOOL ATLAS OF PHYSICAL GEOGRAPHY: ILLUSTRATING, IN A SERIES OF MAPS COMPILED FROM THE CELEBRATED ATLASES OF A. KEITH JOHNSTON, AND OF MILNER AND PETERMANN, THE ELEMENTARY FACTS OF GEOLOGY, HYDROLOGY, METEOROLOGY, AND NATURAL HISTORY; AND DESIGNED TO ACCOMPANY CARTÉE'S "ELEMENTS OF PHYSICAL AND POLITICAL GEOGRAPHY" (Hickling, Swan, and Brown). A copy of this 13-page publication would be in the personal library of Henry Thoreau.

There was a new edition of Hiram Mattison's edition of [Elijah Hinsdale Burritt's](#) A PLAN OF THE SOLAR SYSTEM EXHIBITING ITS RELATIVE MAGNITUDES AND DISTANCES (New-York: Mason Brothers). The publication office was relocated to New-York city and the work was re-copyrighted by F.J. Huntington. Subsequent editions would be known as "Burritt's Geography of the Heavens." Also published was a large American chart of the planets and their relative statistics, ATLAS TO ILLUSTRATE BURRITT'S GEOGRAPHY OF THE HEAVENS... BY HIRAM MATTISON, A.M.

ASTRONOMY

June 2, Monday: Per [Waldo Emerson](#) this was "the finest day, high noon of the year." He and [Henry Thoreau](#) rode in a wagon to Perez Blood's auction and found his [telescope](#) sold for \$55.⁰⁰ which had "cost ninety-five plus ten."¹⁵³

Thoreau noted that according to Professor [Louis Agassiz](#), the intestinal worms in the mouse are not developed except in the stomach of the cat.¹⁵⁴

He also noted that according [Sir David Brewster's](#) biography of Sir [Isaac Newton](#), with one of the early telescopes it had been possible to read from [Philosophical Transactions](#) at a distance of five hundred feet.

BREWSTER'S NEWTON

ASTRONOMY



June 2. *Carum*, i.e. caraway, in garden. Saw most hummingbirds when cherries were in bloom, — on them.

P. M. — With R.W. E. to Perez Blood's auction.

Telescope sold for fifty-five dollars; cost ninety-five plus ten. See Camilla on rye, undulating light and shade; not 19th of April.¹⁵⁵ Returned by bridle-road. *Myrica cerifera*, possibly yesterday. Very few buds shed pollen yet; more, probably, to-day. Leaves nearly an inch long, and shoot and all no more. English hawthorn will open apparently in two days.

Agassiz tells his class that the intestinal worms in the mouse are not developed except in the stomach of the cat. 5 P.M. — To *Azalea nudiflora*, which is in prime. *Ranunculus recurvatus* the same; how long? White maple keys conspicuous.

In the first volume of Brewster's "Life of Newton" I read that with one of the early telescopes they could read the "Philosophical Transactions" at five hundred feet distance.

1857

May 8, Friday: [Harvard Observatory](#) produced a collodion photograph of the surface of the moon.

ASTRONOMY

153. A couple of years earlier, Henry's telescope had cost him \$8, more than a week's wages, the equivalent of perhaps \$800 today. Blood's telescope would in today's money have been a device costing in the range of \$10,000, a number of months' salary.

ASTRONOMY

ASTRONOMY



May 8, Friday: A third fine day.

The sugar maple at Barrett's is now in full bloom.

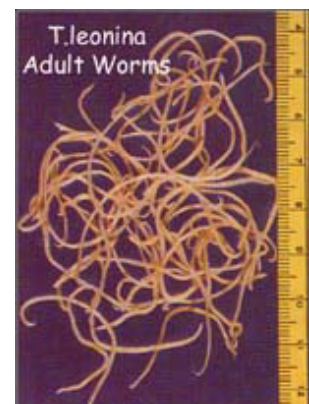
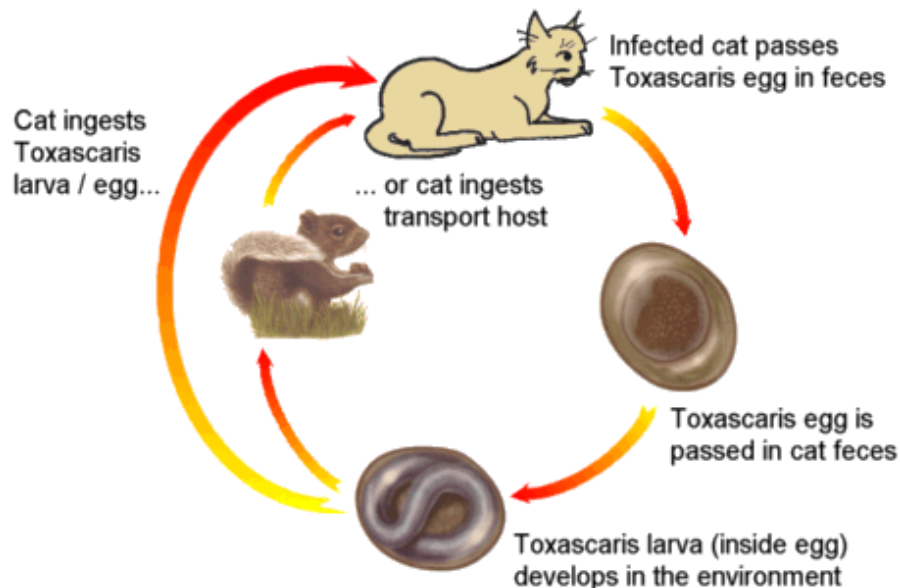
I finish the arbor to-night. This has been the third of these remarkably warm and beautiful [days]. I have worked all the while in my shirt-sleeves. Summer has suddenly come upon us, and the birds all together. Some boys have bathed in the river.

Walk to first stone bridge at sunset. *Salix alba*, possibly the 6th. It is a glorious evening. I scent the expanding willow leaves (for there are very few blossoms yet) fifteen rods off. Already hear the cheerful, sprightly note of the yellowbird amid them. It is perfectly warm and still, and the green grass reminds me of June. The air is full of the fragrance of willow leaves. The high water stretches smooth around. I hear the sound of Barrett's sawmill with singular distinctness. The ring of toads, the note of the yellowbird, the rich warble of the red-wing, [Red-winged Blackbird *Agelaius phoeniceus*] the thrasher on the hillside, the robin's evening song, the woodpecker tapping some dead tree across the water; and I see countless little fuzzy gnats in the air, and dust over the road, between me and the departed sun. Perhaps the evenings of the 6th and 7th were as pleasant. But such an evening makes a crisis in the year. I must make haste home and go out on the water.

I paddle to the Wheeler meadow east of hill after sundown. From amid the alders, etc., I hear the mew of the catbird and the yorrick of Wilson's thrush. One bullfrog's faint *er-er-roonk* from a distance. (Perhaps the *Amphibia*, better than any creatures, celebrate the changes of temperature.) One *dump* note. It grows dark around. The full moon rises, and I paddle by its light. It is all evening for the soft-snoring, purring frogs (which I suspect to be *Rana palustris*). I get within a few feet of them as they sit along the edge of the river and meadow, but cannot see them. Their croak is very fine or rapid, and has a soft, purring sound at a little distance. I see them paddling in the water like toads.

Within a week I have had made a pair of corduroy pants, which cost when done \$1.⁶⁰. They are of that peculiar clay-color, reflecting the light from portions of their surface. They have this advantage, that, beside being very strong, they will look about as well three months hence as now,—or as ill, some would say. Most of my friends are disturbed by my wearing them. I can get four or five pairs for what one ordinary pair would cost in Boston, and each of the former will last two or three times as long under the same circumstances. The tailor said that the stuff was not made in this country; that it was worn by the Irish at home, and now they would not look at it, but others would not wear it, durable and cheap as it is, because it is worn by the Irish. Moreover, I like the color on other accounts. Anything but black clothes. I was pleased the other day to see a son of Concord return after an absence of eight years, not in a shining suit of black, with polished boots and a beaver or silk hat, as if on a furlough from human duties generally,—a mere clothes-horse,—but clad in an honest clay-colored suit and a snug every-day cap. It showed unusual manhood. Most returning sons come home dressed for the occasion. The birds and beasts are not afraid of me now. A mink came within twenty feet of me the other day as soon as my companion had left me, and if I had had my gray sack on as well as my corduroys, it would perhaps have come quite up to me. Even farmers' boys, returning to their native town, though not unfamiliar with homely and dirty

154. When a carnivore ingests an infected prey animal, the larvae of the *Toxascaris leonina* roundworms mature within the walls and lumen of the predator's small intestine. When the female worm becomes an adult, it lays eggs which pass with the feces. The eggs become infective some 3-6 days after defecation, and rodents such as mice and squirrels become infected when they consume something that has been in contact with these feces. The the eggs hatch within the rodent's digestive system and the larvae migrate through its tissues. When the rodent is consumed, larvae are released in the digestive system of the carnivore and the cycle repeats.





clothes, make their appearance on this new stage in a go-to-meeting suit.

That was the spring of 1857, and I've got a story for you from the fall of 1957. In the passage of a calendar century some things change, and some things not. I was in Corpus Christi, Texas trying out living with my father instead of my mother in Indiana, the weather turned a bit chilly one day and I didn't have anything warm, so I stopped by a Goodwills and for fifty cents picked up a very nice, clean sports jacket. I thought its bold contrasting colors were fetching. My father saw this jacket and then it just disappeared. I went looking around the house for it endlessly, and finally he put his hand on my shoulder and, in a low tone, explained "With you having grown up with your mother, it's OK that you don't understand — but that's from the local nigger high school. I can't let you wear something like that — because you're my son." Now isn't that interesting! We have [Henry David Thoreau](#) forever being accused of being prejudiced against the Irish yet there he was, the only person in his Concord 19th-Century ambience who wasn't being very careful not to dress like an Irishman.

June 13, Saturday: Carl Czerny drew up his will leaving everything to his housekeeper and her brother, the Gesellschaft der Musikfreunde in Wien, and various charitable organizations.

A silly publication by a German astrologer titled WILL THE GREAT COMET NOW APPROACHING STRIKE THE EARTH? had predicted that a [comet](#) that had allegedly visited the solar system in 1264 and 1556 would again arrive, and at the very least would on this pass overheat the earth or even impact it, on this date. During this hot June the 3rd Earl of Mainsbury, James Howard, jotted in his diary "We are suffering under an extraordinary heat. People are really getting alarmed for if it is occasioned by the comet which is not yet visible, what must we expect when it reaches our Globe!" According to a foreign correspondent for [Harper's](#) magazine, there was panic in Paris. — There was no such comet, of course, nor in fact had there been such a comet in 1556. It had all been supermarket-tabloid trash talk.

SKY EVENT



November 8, Sunday: A warm cloudy, rain-threatening morning. About 10 A.M. a long flock of geese [[Canada Goose](#) [Branta canadensis](#)] are going over from northeast to southeast, or parallel with the general direction of the coast and great mountain-ranges. The sonorous, quavering sounds of the geese are the voice of this cloudy air, — a sound that comes from directly between us and the sky; an aerial sound, and yet so distinct, heavy, and sonorous, a clanking chain drawn through the heavy air. I saw through my window some children looking up and pointing their tiny bows into the heavens, and I knew at once that the geese were in the air. It is always an exciting event. The children, instinctively aware of its importance, rushed into the house to tell their parents. These travellers are revealed to you by the upward-turned gaze of men. And though these undulating lines are melting into the southwestern sky, the sound comes clear and distinct to you as the clank of a chain in a neighboring smithy. So they migrate, not flitting from hedge to hedge, but from latitude to latitude, from State to State, steering boldly out into the ocean of the air. It is remarkable how these large objects, so plain when your vision is rightly directed, may be lost in the sky if you look away for a moment, — as hard to hit as a star with a telescope. It is a sort of encouraging or soothing sound to assuage their painful fears when they go over a town, as a man moans to deaden physical pain. The direction of their flight each spring and autumn reminds us inlanders how the coast trends. In the afternoon I met Flood, who had just endeavored to draw my attention to a flock of geese in the mizzling air, but encountering me he lost sight of them, while I, at length, looking that way, discerned them though he could not. This was the third flock to-day. Now if ever, then, we may expect a change in the weather.

ASTRONOMY

P.M. —To the swamp in front of the C. Miles house.

The great white pines on the hill south of it were cut, apparently last winter. I count on two stumps about one hundred and twenty-five rings, and the sap averages in each case about three inches thick.

In a thick white pine wood, as in that swamp at the east end, where the ground is level, the ground now (and for

155. Thoreau here alludes to the Concord memory that on the memorable day of April 19th, 1775, the spring having been exceptionally early, grass and grain were already high enough to be bending with the breeze.

some time) is completely covered with a carpet of pale-brown leaves, completely concealing the green mosses and even some lycopodiums. The effect is exactly as [if] a uniform pale-brown matting had been spread over the green and russet floor. It is even soothing to walk over this soft and springy bed. How silently and unobserved by most do these changes take place! This additional warm matting is tucked about their roots to defend them from the frost. It is interesting to see the green of mosses peeping out here and there. You hear only the soft crisped sound of sinking needles under your feet.

I find in the swamp there by the larches the *Kalmia glauca*, good specimens.

I have no doubt that a good farmer, who, of course, loves his work, takes exactly the same kind of pleasure in draining a swamp, seeing the water flow out in his newly cut ditch, that a child does in its mud dikes and water-wheels. Both alike love to play with the natural forces. There is quite a ravine by which the water of this swamp flows out eastward, and at the bottom of it many prinus berries are conspicuous, now apparently in their prime. These are appointed to be an ornament of this bare season between leaves and snow. The swamp-pink's large yellowish buds, too, are conspicuous now. I see also the swamp pyrus buds, expanded sometimes into small leaves. This, then, is a regular phenomenon. It is the only shrub or tree that I know which so decidedly springs again in the fall, in the Indian summer. It might be called the Indian-summer shrub. The clethra buds, too, are decidedly expanded there, showing leaflets, but very small. Some of the new pyrus leaves are nearly full-grown. Would not this be a pretty device on some hale and cheery old man's shield, —the swamp pyrus unfolding its leaves again in the fall? Every plant enjoys some preeminence, and this is its. The most forward to respond to the warmer season. How much spring there is in it! Its sap is most easily liquefied. It takes the least sun and mildness to thaw it and develop it. It makes this annual sacrifice of its very first leaves to its love for the sun. While all other shrubs are reserved, this is open and confiding. I see it not without emotion. I too have my spring thoughts even in November. This I see in pleasant October and November days, when rills and birds begin to tinkle in winter fashion through the more open aisles of the swamps.

I do not know exactly what that sweet word is which the chickadee says when it hops near to me now in those ravines.

The chickadee
Hops near to me.

When the air is thick and the sky overcast, we need not walk so far. We give our attention to nearer objects, being less distracted from them. I take occasion to explore some near wood which my walks commonly overshoot.

What a difference it makes between two ravines in other respects exactly similar that in the one there is a stream which drains it, while the other is dry!

I see nowadays in various places the scattered feathers of robins, etc., where some hawk or beast of prey has torn them to pieces.

I step over the slip-noose snares which some woodling has just set. How long since men set snares for partridges [Ruffed Grouse ■ *Bonasa umbellus* (Partridge)] and rabbits?

Ah, my friends, I know you better than you think, and love you better, too. The day after never, we will have an explanation.



December: During a shower, lizards fell upon the streets and sidewalks of Montréal, Québec.

1858

Using the Merz comet-seeker of the [Harvard Observatory](#), assistant astronomer Horace P. Tuttle (1837-1923) would discover three new comets in this year and win for himself the Lalande Prize in astronomy offered by the Academy of Sciences in Paris.

There was a new edition of Hiram Mattison's edition of [Elijah Hinsdale Burritt's](#) A PLAN OF THE SOLAR SYSTEM EXHIBITING ITS RELATIVE MAGNITUDES AND DISTANCES (New York: Mason Brothers).

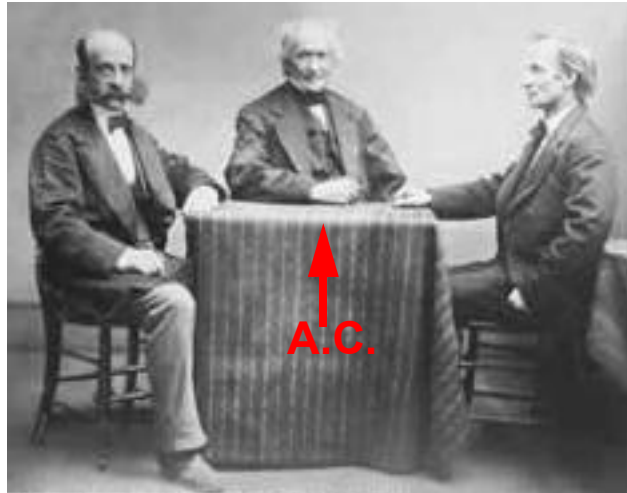
ASTRONOMY

ASTRONOMY

ASTRONOMY

During the late 1850s, [Alvan Clark](#) attracted attention to his company's lenses for large refracting telescopes by discovering two double stars.

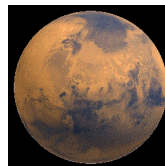
ASTRONOMY



Spring: Because the “atmosphere in Texas has a remarkable transparency, particularly after ‘northers’ ... the skies seem to be nearer to them in Texas than in any other part of the world.... observations in Texas are very satisfactory,”¹⁵⁶ [Caleb G. Forshey](#) was able to make detailed observations of a band of light extending across the night sky along the ecliptic, passing through all the familiar zodiacal constellations, the boundaries of which he traced onto star charts.¹⁵⁷

ASTRONOMY

May 7, Friday: Angelo Secchi supposed that he could make out on the surface of [Mars](#) a “large triangular patch, blue in color,” and this astronomer considered therefore that he had conclusively established the existence of seas and continents on the planet. He designated this blue triangular patch by the name “Atlantic Canale,” which is, very significantly, the first occurrence of a usage similar to “canal” in any context dealing with the planet Mars. In the Italian language this term “Canale,” it should be born in mind, can mean not only “canal,” i.e., a fabricated object, but also “channel,” i.e. a nonfabricated object.



ASTRONOMY

156. [Forshey](#)'s account would be included in George Jones's “Recent Observations, by Various Persons, on the *Gegenschein*, or Completed Arch of the Zodiacal Light” in *Proceedings of the American Association for the Advancement of Science*, XIII (1860), 172-181.

157. The zodiacal light, the zodiacal band, and the *gegenschein* (a brightening in the zodiacal band at the point exactly opposite the Sun) are caused by sunlight reflecting from interplanetary dust particles orbiting the Sun near the ecliptic plane (the plane of the Earth's orbit around the Sun).



ASTRONOMY

ASTRONOMY

June 2, Wednesday: Giovanni Battista Donati (1826-1873) detected what would become the 3rd great new [comet](#) of this century, one with several irregular tails that would slowly be changing shape. This would receive the name VI Donati in his honor. Its coma would be seen to be distorted: **imperfections**, and in the **heavens** yet!

Forebodings of a coming storm were in the air, in everyone's hearts and minds and mouths. Every natural phenomenon was clothed with peculiar significance. The great comet that flamed across the heavens was taken as a sign of approaching war. Strange celestial lights, which nightly illuminated the heavens for weeks with a lurid brazen glow, the like of which had never been seen before by the people; filled their minds with morbid dread. Every one seemed on an intense strain. The slightest incident shattered the nerves.

ASTRONOMY

August: During a violent storm, a large number of small black stones fell on the city of Birmingham, England.

ASTRONOMY

FALL OF STONES

August 19, Thursday: On this night the Great Comet of 1838, which had been being observed through telescopes since June 2nd, began to be visible to the naked eye. The [comet](#) would reach its point of greatest visibility on October 13th.



Forebodings of a coming storm were in the air, in everyone's hearts and minds and mouths. Every natural phenomenon was clothed with peculiar significance. The great comet that flamed across the heavens was taken as a sign of approaching war. Strange celestial lights, which nightly illuminated the heavens for weeks with a lurid brazen glow, the like of which had never been seen before by the people; filled their minds with morbid dread. Every one seemed on an intense strain. The slightest incident shattered the nerves.

ASTRONOMY



August 19: P.M.—Sail to [Baker Farm](#) shore.


It is cool with a considerable northwesterly wind, so that we can sail to Fair Haven. The dog-day weather is suddenly gone and here is a cool, clear, and elastic air. You may say it is the first day of autumn. You notice the louder and clearer ring of crickets, and the large, handsome red spikes of the *Polygonum amphibium* are now generally conspicuous along the shore. The *P. hydropiperoides* fairly begins to show. The front-rank polygonum is now in prime.

We scare up a stake-driver [**American Bittern**  *Botaurus lentiginosus*] several times. The blue heron has within a week reappeared in our meadows, and the stake-driver begins to be seen oftener, and as early as the



ASTRONOMY

ASTRONOMY

5th I noticed young summer ducks about; the same of hawks, owls, etc. This occurs as soon as the young birds can take care of themselves, and some appear to be very early on the return southward, with the very earliest prospect of fall. Such birds are not only more abundant but, methinks, more at leisure now, having reared their family, and perhaps they are less shy. Yes, bitterns are more frequently seen now to lift themselves from amid the pontederia or flags, and take their sluggish flight to a new resting-place, – bitterns which either have got through the labors of breeding or are now first able to shift for themselves. And likewise blue herons [**Great Blue Heron**  *Ardea herodias*] which have bred or been bred not far from us (plainly), are now at leisure, or are impelled to revisit our slow stream. I have not seen the last since spring.

When I see the first heron, like a dusky blue wave undulating over our meadows again, I think, since I saw them going northward the other day, how many of these forms have been added to the landscape, complete from bill to toe while, perhaps, I have idled! I see two herons. A small bird is pursuing the heron as it does a hawk. Perhaps it is a blackbird and the herons gobble up their young!

I see thistle-down, grayish-white, floating low quite across Fair Haven Pond. There is wont to be just water [*sic*] enough above the surface to drive it along. The heads of the wool-grass are now brown and, in many meadows, lodged. The button-bush is about done. Can hardly see a blossom. The mikania not yet quite in prime. Pontederia has already begun to wane; i. e., the fields of them are not so dense, many seed-vessels having turned down; and some leaves are already withered and black, but the remaining spikes are as fair as ever. It chances that I see no yellow lilies. They must be scarce now. The water is high for the season. Water cool to bather.

We have our first green corn to-day, but it is late. The saw-grass (*Paspalum*?) of mown fields, not long.

I noticed the localities of black willows as far up as the mouth of the river in Fair Haven Pond, but not so carefully as elsewhere, and from the last observations I infer that the willow grows especially and almost exclusively in places where the drift is most likely to lodge, as on capes and points and concave sides of the river, though I noticed a few exceptions to my rule.

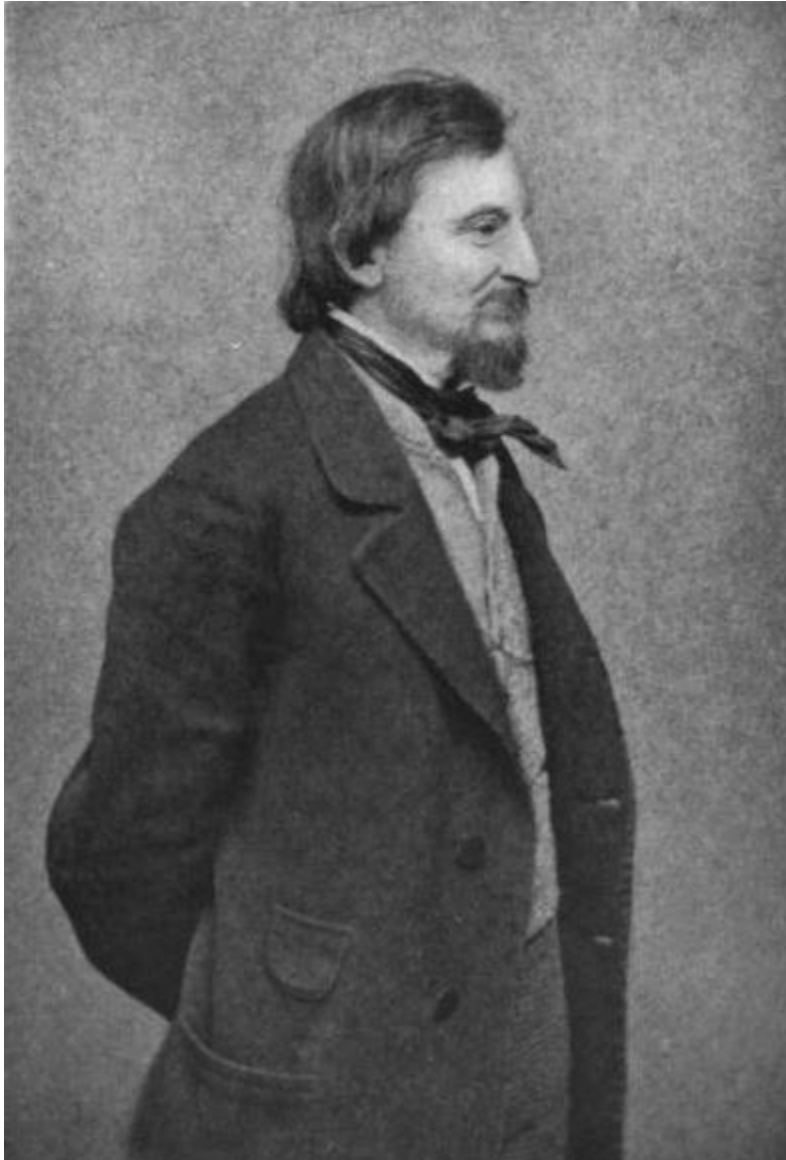
It is so cool, some apprehend a frost to-night.

JAMES BAKER

August 20, Friday: Donati's [comet](#) was beginning to exhibit traces of a tail.

SKY EVENT

[Friend Daniel Ricketson](#)'s A HISTORY OF [NEW BEDFORD](#), INCLUDING A HISTORY OF THE OLD TOWNSHIP OF DARTMOUTH & THE PRESENT TOWNSHIPS OF WESTPORT, DARTMOUTH & FAIRHAVEN (this has been republished as of 1996 and is therefore not available for total download, but we do have online the version of the Ricketson history of New Bedford that was published in 1803).¹⁵⁸



[VIEW THE PAGE IMAGES](#)

158. Thoreau, in his letter to Ricketson on November 22, 1858, would comment that "I like the homeliness of it, that is, the good, old-fashioned way of writing as if you actually lived where you wrote." Emerson, in a letter to Ricketson on October 11, 1869, would comment that "It is written with good sense and with selection, and with affection."

In his biography of Thoreau, Franklin Benjamin Sanborn indicates that despite [Michael Flannery](#)'s early rising, "Up early enough to see a frost in August!" and abundant energy and cheerfulness and gratefulness for all the help given to him, the Flannery family would never be able to repay all of the money it had borrowed in the period of its crisis:

When Sophia left Concord to live and die in Bangor, among her cousins, she gave me a small note of hand, which Flannery had signed for money lent him in some pinch, with instructions to receive payment if he was able to pay, but in any case to give him up the note, which I did.



August 20: Edward Hoar has found in his garden two or three specimens of what appears to be the *Veronica Buxbaumii*, which blossomed at least a month ago. Yet I should say the pods were turgid, and, though obcordate enough, I do not know in what sense they are "obcordate-triangular." He found a *Viburnum dentatum* with leaves somewhat narrower than common and wedgeshaped at base. He has also the *Rudbeckia speciosa*, cultivated in a Concord garden.

Flannery tells me that at about four o'clock this morning he saw white frost on the grass in the low ground near Holbrook's meadow. Up early enough to see a frost in August!

MICHAEL FLANNERY

P. M. – To Poplar Hill and the Great Fields.

It is still cool weather with a northwest wind. This weather is a preface to autumn. There is more shadow in the landscape than a week ago, methinks, and the creak of the cricket sounds cool and steady.

The grass and foliage and landscape generally are of a more thought-inspiring color, suggest what some perchance would call a pleasing melancholy. In some meadows, as I look southwesterly, the aftermath looks a bright yellowish-green in patches. Both willows and poplars have leaves of a light color, at least beneath, contrasting with most other trees.

Generally there has been no drought this year. Nothing in the landscape suggests it. Yet no doubt these leaves are, compared with themselves six or eight weeks ago, as usual, "horny and dry," as one remarks by my side.

You see them digging potatoes, with cart and barrels, in the fields on all hands, before they are fairly ripe, for fear of rot or a fall in the price, and I see the empty barrels coming back from market already.

Polygonum dumetorum, how long?

August 29, Sunday: Donati's [comet](#) was becoming visible to the naked eye, in the before-sunrise and after-sunset skies.

In the afternoon [Henry Thoreau](#) went on the Assabet River to Jacob B. Farmer's, and learned that he had shot a sharp-shinned hawk that morning while it was trying to strike a chicken.



August 29: I hear this morning one *eat it potter* from a golden robin. They are now rarely seen.

The ghost-horse (*Spectrum*) is seen nowadays, – several of them. All these high colors in the stems and leaves and other portions of plants answer to some maturity in us. I presume if I am the wiser for having lived this season through, such plants will emblazon the truth of my experience over the face of nature, and I shall be aware of a beauty and sweetness there.

Has not the mind, too, its harvest? Do not some scarlet leaves of thought come scatteringly down, though it may be prematurely, some which, perchance, the summer's drought has ripened, and the rain loosened? Are there no purple reflections from the culms of thought in my mind?

I remember when boiled green corn was sold piping hot on a muster-field in this town, and my father says that he remembers when it used to be carried about the streets of Boston in large baskets on the bare heads of negro women, and gentlemen would stop, buy an ear, and eat it in the street.

Ah! what a voice was that hawk's or eagle's of the 22d! Think of hearing, as you walk the earth, as usual in leaden shoes, a fine, shrill scream from time to time, which you would vainly endeavor to refer to its true source if you had not watched the bird in its upward flight. It comes from yonder black spot on the bosom of a cloud. I should not have suspected that sound to have issued from the bosom of a cloud if I had not seen the bird. What motive can an eagle have for screaming among the clouds, unobserved by terrestrial creatures? We walk



invested by sound, – the cricket in the grass and the eagle in the clouds. And so it circled over, and I strained my eyes to follow it, though my ears heard it without effort.

Almost the very sands confess the ripening influence of the August sun, and, methinks, with the slender grasses waving over them, reflect a purple tinge. The empurpled sands. Such is the consequence of all this sunshine absorbed into the pores of plants and of the earth. All sap or blood is wine-colored. The very bare sands, methinks, yield a purple refecation. At last we have not only the purple sea, but the purple land.

P.M.– To J. Farmer's *via* Assabet.

As, standing up in my boat, I am watching some minnows at the Prichard bend steadily stemming the current in the sunny water between the waving potamogeton, right under my face, I see a musquash gliding along above the sand directly beneath them, a perfect denizen of the water as much as they. This rat was a pale brown, as light as pale-brown paper or perfectly withered white oak leaves. Its coat is never of this color out of water, and I suppose it was because it was completely coated with air. This makes it less visible on a sandy bottom.

Is not that *Eleocharis tenuis*, long since out of bloom, growing in the water along the Merrick shore, near the oak; round culms, fifteen inches to two feet high? A spiked rush, without a leaf, and round. I can hardly find a head left on it. Yet Flint says this blooms in August! It grows in dense fields like pipes. Did I find it before this year?

The mikania is apparently in prime or a little past. Perhaps the front-rank polygonum is in prime now, for there is apparently more than before.

I look along Mantatuket Field hedge to see if there are hazelnuts there, but am surprised to find that thereabouts the bushes have been completely stripped by squirrels already and the rich brown burs are strewn on the ground beneath. What a fine brown these dried burs have already acquired, – not chestnut nor hazel! I fear it is already too late for me, though I find some yet quite green in another place. They must have been very busy collecting these nuts and husking them for a fortnight past, climbing to the extremities of the slender twigs. Who witnesses the gathering of the hazelnuts, the hazel harvest? Yet what a busy and important season to the striped squirrel! Now, if ever, he needs to get up a bee. Every nut that I could find left in that field was a poor one. By more frequented paths the squirrels have not worked yet. Take warning from the squirrel, which is already laying up his winter store.

I see some *Cornus sericea* berries turning. The Assabet helianthus (apparently variety of *decapetalus*), well out some days at least. Are not the petals peculiarly reflexed? Small botrychium in the bobolink meadow, not yet. *Gentiana Andrewsii*, one not quite shedding pollen.

Before bathing at the Pokelogan, I see and hear a school of large suckers, which have come into this narrow bay and are swiftly dashing about and rising to the surface, with a bubbling sound, as if to snatch something from the surface. They agitate the whole bay. They [are] great ruddy-looking fellows, limber with life. How intelligent of all watery knowledge! They seem to measure the length, breadth, and depth of that cove –which perhaps they never entered before– with every wave of their fins. They feel it all at once. With what superfluous vigor they seem to move about restlessly in their element! Lift them but six inches, and they would quirk their tails in vain. They are poor, soft fish, however, large as they are, and taste when cooked at present much like boiled brown paper.

The wild *Monarda fistulosa* is apparently nearly done.



Cicuta maculata, apparently generally done.


J. Farmer shot a sharp-shinned hawk this morning, which was endeavoring to catch one of his chickens. I bring it home and find that it measures seventeen inches in length and thirty in alar extent, and the tail extends four inches beyond the closed wings. It has a very large head, and the wing is six and a half inches wide at the secondaries. It is dark-brown above, skirted with ferruginous; scapulars, with white spots; legs, bright-yellow; iris, yellow. Has those peculiar pendulous lobes to the feet, which Farmer thinks are to enable it to hold a small bone of its prey between the nail and the lobe, as it feeds, while perching. The breast and belly feathers are shafted with dark-brown pointed spots. Vent white. There are three obvious slate-colored bars to tail, alternating with the black.¹⁵⁹

F. says that he has seen the nest of a smaller hawk, the pigeon hawk, heretofore, on an oak (in Owl-Nest Swamp), made of sticks, some fifteen feet from ground. R. Rice says that he has found the nest of the pigeon hawk hereabouts.

We go to see a bittern nest by Spencer Brook. F. says they call the cardinal-flower “slink-weed,” and say that the eating it will cause cows to miscarry. He calls the *Viburnum nudum* “withe-wood,” and makes a withe by treading on one end and twisting by the other till he cracks it and makes it flexible so that it will bend without breaking. The bittern’s nest was close to the edge of the brook, eighteen inches above the water, and was made of the withered sedge that had grown close by (*i.e.* wool-grass, etc.) and what I have called [two] pages back *Eleocharis tenuis*. It was quite a deep nest, like and as big as a hen’s nest, deep in the grass. He or his son saw the young about it a month ago.

He hears –heard a week ago– the sound of a bird flying over, like *cra-a-ack*, *cr-r-r-a-k*, only in the night, and thinks it may be a blue heron.¹⁶⁰

We saw where many cranberries had been frost-bitten, F. thinks the night of the 23d. They are much injured. *Spiranthes cernua*, how long? Near the bittern-nest, grows what F. calls blue-joint grass; out of bloom.

Returning, rather late afternoon, we saw some forty martins [**Purple Martin**  *Progne subis*] sitting in a row and twittering on the ridge of his *old* house, apparently preparing to migrate. He [Jacob Farmer] had never seen it before. Soon they all took to flight and filled the air in the neighborhood.

The sharp-shinned hawk of to-day is much larger than that of July 21st, though the colors, etc., etc., appear to be essentially the same. Yet its leg is not so stout as that which Farrar¹⁶¹ gave me, but is at least half an inch longer.¹⁶² The toes, especially, are longer and more slender, but I am not sure whether Farrar’s hawk has those pendulous lobes, the foot is so dry, nor if it had sharp-edged shin, it being eaten away by worms. The inner vanes of the primaries of Farrar’s bird are brighter white with much narrower bars of blackish. The longest primary of Farrar’s bird is about ten inches; that of today, about eight inches. I find the outside tail-feathers of to-day’s bird much harder to pull than the inside ones!¹⁶³

159. I have the wing, legs, and tail of this specimen. *Vide* next page.

160. *Vide* three pages forward.

161. *Vide* October 11, 1856.

162. Which makes me think Farrar’s another species. He said it had not a white rump.

Our black willow is of so peculiar and light a green, so ethereal, that, as I look back forty rods at those by the Heron Rock, their outlines are seen with perfect distinctness against the darker green of maples, etc., three or four rods behind them, as if they were a green cloud or smoke blown by. They are seen as distinctly against these other trees as they would be against the sky.

Rice tells me a queer story. Some twenty-five years ago he and his brother William took a journey in their wagon into the northwest part of Maine, carrying their guns and fishing-tackle with them. At Fryeburg they visited the scene of Lovewell's Fight, and, seeing some trout in the stream there, they tried to dig some fishworms for bait, but they could not find any. So they asked a boy where they got fishworms, but he did not know what they meant. "Long, slender worms, angleworms," said they; but he only answered that he had seen worms in their manure-heap (which were grubs). On inquiring further, they found that the inhabitants had never seen nor heard of angleworms, and one old settler, who had come from Massachusetts and had lived there thirty years, declared that there was no such worm in that neighborhood.

Mr. Farmer gave me a turtle-shaped bug found by Melvin on a board by the river, some time ago.

I hear A—— W—— complained of for overworking his cattle and hired men, but there is this to be said in his favor, that he does not spare himself. They say that he made his horse "Tom" draw twenty-nine hundred of hay to Boston the other day, –or night,– but then he put his shoulder to the wheel at every hill. I hear that since then the horse has died, but W—— is alive and working.

How hard one must work in order to acquire his language, — words by which to express himself! I have known a particular rush, for instance, for at least twenty years, but have ever been prevented from describing some [of] its peculiarities, because I did not know its name nor any one in the neighborhood who could tell me it. With the knowledge of the name comes a distincter recognition and knowledge of the thing. That shore is now more describable, and poetic even. My knowledge was cramped and confined before, and grew rusty because not used, — for it could not be used. My knowledge now becomes communicable and grows by communication. I can now learn what others know about the same thing.¹⁶⁴

September 6, Monday: Curvature was noted in the developing tail of [Donati's comet](#).

SKY EVENT



September 6: 6 A.M.— To Merrick's shore.

Hear a warbling vireo, sounding very rare and rather imperfect. I think this is what I have mistaken for the young purple finch note.

Also hear apparently a yellow-throated vireo.

That fine spreading-panicled dark-purple grass, now rising all along the river near the waterside, is *Panicum agrostoides*; in prime. That finer and narrower-panicled, now out of bloom, is red-top, or else white bent; with the former.

River risen still higher, and weeds covered.

P.M.— To Ledum Swamp.

Going over Clamshell Plain, I see a very large flock of a hundred or more cowbirds about some cows. They whirl away on some alarm and alight on a neighboring rail fence, close together on the rails, one above another. Then away they whirl and settle on a white oak top near me. Half of them are evidently quite young birds, having glossy black breasts with a drab line down middle. The heads of all are light-colored, perhaps a slaty drab, and some apparently wholly of this color.

On the hillside above Clamshell Ditch, grows that handsome grass of Sept. 1st (*vide* September 4th), evidently *Sorghum nutans* (*Andropogon* of Bigelow), chestnut beard grass, Indian grass, wood grass. It is much larger than what I saw before; is still abundantly in flower; four and a half feet high; leaves, perhaps arundinaceous,

163. *Vide* July 21st. *Vide* May 17, 1860.

164. The poet W.H. Auden has in 1962 brought forward a snippet from this day's entry as:

THE VIKING BOOK OF APHORISMS, A PERSONAL SELECTION BY W.H. AUDEN...

Pg	Topic	Aphorism Selected by Auden out of Thoreau
358	Language and Ideas	With a knowledge of the name comes a distincter recognition and knowledge of the thing.

eighteen inches long; panicle, nine inches long. It is a very handsome, wild-looking grass, well enough called Indian grass, and I should have named it with the other andropogons, August 26th. With its narrow one-sided panicle of bright purple and yellow (I include the yellow anthers) often waving [?], raised high above the leaves, it looks like a narrow banner. It is of more vivid colors than its congeners, and might well have caught an Indian's eye. These bright banners are now advanced on the distant hillsides, not in large armies, but scattered troops or single file, like the red men themselves. They stand thus fair and bright in our midst, as it were representative of the race which they are named after, but for the most part unobserved. It stands like an Indian chief taking a last look at his beloved hunting grounds. The expression of this grass haunted me for a week after I first passed and noticed it, like the glance of an eye.

Aster patens past prime at Money-Diggers' Hill. *Polygonum tenue*, how long? *Solidago nemoralis* is apparently in prime on Lupine Hill; some of it past. It is swarming with butterflies,—yellow, small red, and large,—fluttering over it. At Ledum Pool edge, I find the *Woodwardia Virginica* fern, its fruit mostly turned deep reddish-brown. It appears to grow only close to the pool, part of the fruit forming two lines parallel with the midrib. A third part of the nesaea there is turned scarlet. *Kalmia glauca* is again in bloom. The hairy huckleberries are rather scarce and soft. They are insipid and leave a hairy skin in the mouth.

That swamp is a singularly wild place, without any natural outlet. I hear of a marsh hawk's nest there this summer. I see great spiders there of an uncommon kind, whose webs—the main supporting line—stretch six feet in the clear from spruce to spruce, as high as my head, with a dense web of the usual form some fifteen inches in diameter beneath.

Stopped and talked with W—— W——¹⁶⁵ and ate a watermelon with him on the grass. Once his senseless democracy appeared. He spoke with an ignorant pride of Buchanan's telegraphic message, of which most of us were ashamed; said he supposed he had more learning than Victoria! But the less said about them the better. Seeing a stake-driver flying up the river, he observed that when you saw that bird flying about it was a never-failing sign of a storm approaching. How many of these sayings like this arise not from a close and frequent observation of the phenomena of nature, but from a distant and casual one!

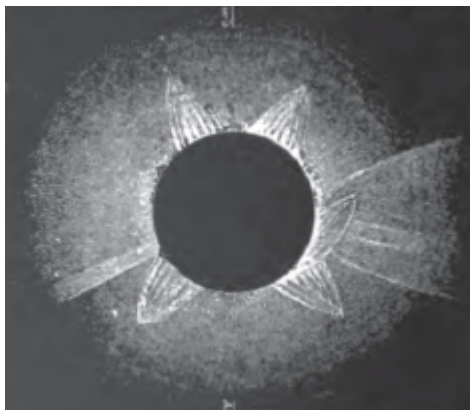
I find very common in prime by roadsides, in dry ground, etc., *Vilfa vaginæflora*, rush grass, hidden-flowered vilfa; also by Corner roadside, beyond brooks, *Panicum filiforme* with and like *P. sanguinale*, apparently in prime, and with last fills the old mullein-field in front of Bear Garden Hill.¹⁶⁶

Is that narrowly-linear-leaved potamogeton, all immersed and now forming dense beds in the Assabet, a distinct species, or only the immersed leaves of one?

Vide pressed.

A year ago last spring I gave to Edith Emerson and to Sophia some clasping hound's-tongue seeds, it being very rare hereabouts, wishing to spread it. Now and for a long time it has been a pest in the garden (it does not bloom till the second year), by its seeds clinging to our clothes. Mrs. E. has carried it to Boston thus, and I have spent twenty minutes at once in clearing myself of it. So it is in a fair way to be dispersed.

September 7, Tuesday: A total eclipse of the sun was viewable across South America.¹⁶⁷



Samuel Storow Higginson brought some eggs from Deerfield to show Henry Thoreau “among others apparently that of the Virginia rail”:



September 7: P.M. — To Assabet Bath.

165. Would this have been the William H. Wheildon who was farming the Lee Farm or the W.W. Wilde who took the 1850 census?
166. In recent years Bear Garden Hill has been proposed for a condo complex, to accompany the office development proposed for Brister's Hill.



I turn Anthony's corner. It is an early September afternoon, melting warm and sunny; the thousands of grasshoppers leaping before you reflect gleams of light; a little distance off the field is yellowed with a Xerxean army of *Solidago nemoralis* between me and the sun; the earth-song of the cricket comes up through all; and ever and anon the hot z-ing of the locust is heard. (Poultry is now fattening on grasshoppers.) The dry deserted fields are one mass of yellow, like a color shoved to one side on Nature's palette. You literally wade in yellow flowers knee-deep, and now the moist banks and low hollows are beginning to be abundantly sugared with *Aster Tradescanti*. [Channing, pages 104, 105.]

J. Farmer calls those *Rubus sempervirens* berries, now abundant, "snake blackberries."

Looking for my Maryland yellow-throat's nest, I find that apparently a snake has made it the portico to his dwelling, there being a hole descending into the earth through it!

In Shad-bush Meadow the prevailing grasses (not sedges) now are the slender *Panicum clandestinum*, whose seeds are generally dropped now, *Panicum virgatum*, in large tufts, and blue-joint, the last, of course, long since done. These are all the grasses that I notice there.

What a contrast to sink your head so as to cover your ears with water, and hear only the confused noise of the rushing river, and then to raise your ears above water and hear the steady creaking of crickets in the aerial universe!

While dressing, I see two small hawks, probably partridge hawks, soaring and circling about one hundred feet above the river. Suddenly one drops down from that height almost perfectly perpendicularly after some prey, till it is lost behind the bushes.

Near the little bridge at the foot of Turtle Bank, *Eragrostis capillaris* in small but dense patches, apparently in prime (the *Poa capillaris* of Bigelow). What I have thus called in press is *E. pectinacea* (*P. hirsuta* of Bigelow). On the flat hill south of Abel Hosmer, *Agrostis scabra*, hair grass, flyaway grass, tickle grass, out of bloom; branches purplish. That of September 5th was the *A. perennans*, in lower ground.

On the railroad between tracks above Red House, *Aristida dichotoma*, half a dozen inches high, hardly yet out; forked aristida, or poverty grass.



Storrow Higginson brings from Deerfield this evening some eggs to show me, – among others apparently that of the Virginian rail. It agrees in color, size, etc., according to Wilson, and is like (except, *perhaps*, in form) to one which E. Bartlett brought me a week or ten days ago, which dropped from a load of hay carried to Stow's barn! So perhaps it breeds here.¹⁶⁷ Also a smaller egg of same form, but dull white with very pale dusky spots, which may be that of the Carolina rail. He had also what I think the egg of the *Falco fuscatus*,¹⁶⁹ it agreeing with [MacGillivray's](#) sparrow hawk's egg.¹⁷⁰

September 12, Sunday: At the Harvard College Observatory, a sudden increase in the brightness of Donati's Comet was noted and placed on record. The head, which was of the third magnitude, contained within it a false nucleus of the 5th magnitude. The tail was measured at six degrees. Its brightness would continue to increase, and it would begin to exhibit first one and then another straight ray of tail. At some point, as the [comet](#) approached, the Earl of Malmesbury jotted into his diary that "The largest comet I ever saw became visible with a very broad tail spread perpendicularly over the sky, the weather being very hot. Everyone now believes in war."

SKY EVENT

167. This was part of the well understood "Saros cycle 142" which repeats itself, for a series of 72 eclipse events, every 18 years plus 11 days and began with the partial solar eclipse of April 17, 1624. This cycle of 72 regular eclipse events will provide total eclipses somewhere on the face of the earth from July 25, 1786 through October 29, 2543. The longest duration of totality during this regular 72-occurrence series will come on May 28, 2291, when the totality will persist for 6 minutes and 34 seconds. The 72d and final event in the series will be a partial eclipse that will occur, God willing, on June 5, 2904. [Lt. James Melville Gilliss](#) of the US Naval Observatory would prepare, in 1859, AN ACCOUNT OF THE TOTAL [ECLIPSE](#) OF THE SUN ON SEPTEMBER 7, 1858 (Washington DC).

168. Yes. Vide September 9th. Vide September 21st and December 7th, and June 1st, 1859. Vide 18th.

169. [Question by Austin Meredith: Does anyone have any idea what this *Falco fuscatus* might be?]

170. [William MacGillivray](#). DESCRIPTIONS OF THE RAPACIOUS BIRDS OF GREAT BRITAIN (Edinburgh: Maclachlan & Stewart, 1836).

RAPACIOUS BIRDS OF GB

[This volume found in Henry Thoreau's personal library is now in Special Collections at the Concord Free Public Library.]



September 12, Sunday: P.M.– To Cliffs.

The handsome crimson-tipped hazelnut burs now and for some time have reminded us that it was time to gather these nuts. They are worth gathering, if only to see the rich color of the fruit brought together in a quantity.

Lycopodium complanatum, how long? Have seen the pigeon's-egg fungus in pastures some time. Yew berries still hold on. The cinnamon fern has begun to yellow and wither. How rich in its decay! *Sic transit gloria mundi!* Die like the leaves, which are most beautiful in their decay. Thus gradually and successively each plant lends its richest color to the general effect, and in the fittest place, and passes away. Amid the October woods we hear no funereal bell, but the scream of the jay. Coming to some shady meadow's edge, you find that the cinnamon fern has suddenly turned this rich yellow. Thus each plant surely acts its part, and lends its effect to the general impression. See petty morel berries ripe.

Woodsia ilvensis under the cave at Cliffs in fruit.

Very heavy rain all yesterday afternoon, and to-day it is somewhat cooler and clearer and the wind more northwesterly, and I see the unusual sight of ripples or waves curving up-stream off Cardinal Shore, so that the river might seem to be flowing that way. The mountains are of a darker blue.



The spring on the west side of Fair Haven Hill is nearly dry; there is no stream flowing from it. What a disappointment to a herd of cows to find their accustomed spring dry! Even in that little hollow on the hillside, commonly moistened by the spring, grow the soft rush, rhynchospora, etc. What an effect a little moisture on a hillside produces, though only a rod square! The *Juncaceae* and *Cyperaceae* soon find it out and establish themselves there.

The *Panicum filiforme* is very abundant in that old mullein-field of Potter's, by the Corner road. Its slender culms are purple, and, seen in the right light, where they stand thick, they give a purple gleam to the field. More purple far than the *P. sanguinale*. Some small red maples by water begun to redden.

In Hubbard's ditched meadow, this side his grove, I see a great many large spider's webs stretched across the ditches, about two feet from bank to bank, though the thick woven part is ten or twelve inches. They are parallel, a few inches or a foot or more apart, and more or less vertical, and attached to a main cable stretched from bank to bank. They are the yellow-backed spider, commonly large and stout but of various sizes. I count sixty-four such webs there, and in each case the spider occupies the centre, head downward. This is enough, methinks, to establish the rule. They are not afraid of turning their brains then. Many insects must be winging their way over this small river. It reminds me of the Indians catching ducks at Green Bay with nets in old times.

September 18, Saturday: Gioachino Rossini purchased land on which to build a villa, from the city of Paris near the Bois de Boulogne (stipulating that the city would be able to buy it back upon his death).



September 18: P.M. – Sail to Fair Haven Pond.

It is a fine September day. The river is still rising on account of the rain of the 16th and is getting pretty well over the meadows. As we paddle westward, toward College Meadow, I perceive that a new season has come. The air is incredibly clear. The surface of both land and water is bright, as if washed by the recent rain and then seen through a much finer, clearer, and cooler air. The surface of the river sparkles. I am struck by the soft yellow-brown or brown-yellow of the black willows, stretching in cloud-shaped wreaths far away along the edges of the stream, of a so much mellow and maturer tint than the elms and oaks and most other trees seen above and beyond them. It is remarkable that the button-bushes beneath and mingling with them are of exactly the same tint and in perfect harmony with them. They are like two interrupted long brown-yellow masses of verdure resting on the water, a peculiarly soft and warm yellow. This is, perhaps, the most interesting autumnal tint as yet.

Above the railroad bridge, with our sail set, wind north-northwest, we see two small ducks, dusky, – perhaps dippers [Too large. *Vide* 30th.], or summer ducks, – and sail within four rods before they fly. They are so tame that for a while we take them for tame ducks.

The pads are drowned by the flood, but I see one pontederia spike rising blue above the surface. Elsewhere the dark withered pontederia leaves show themselves, and at a distance look like ducks, and so help conceal them. For the ducks are now back again in numbers, since the storm and freshet.



We can just go over the ammannia meadow.

It is a wonderful day. As I look westward, this fine air – “gassy,” C. calls it – brings out the grain of the hills. I look into the distant sod. This air and sun, too, bring out all the yellow that is in the herbage. The very grass or sedge of the meadow is the same soft yellow with the willows, and the button-bush harmonizes with them. It is as if the earth were one ripe fruit, like a muskmelon yellowed in the September sun; *i.e.*, the sedges, being brought between me and the sun, are seen to be ripe like the cucumbers and muskmelons in the garden. The earth is yellowing in the September sun. It occurs to me to put my knee on it, press it gently, and hear if it does not crack within as if ripe. Has it not, too, a musty fragrance, as a melon?

At Clamshell we take the wind again, and away we glide. I notice, along the edge of the eastern meadow wood, some very light-colored and crisped-looking leaves, apparently on small maples, or else swamp white oaks, as if some vine ran over the trees, for the leaves are of a different color from the rest. This must be the effect of frost, I think.

The sedge and wool-grass all slant strongly southward or up the stream now, which makes a strange impression on the sailor, but of late the wind has been north and stronger than the sluggish current of the river.

The small white pines on the side of Fair Haven Hill now look remarkably green, by contrast with the surrounding shrubbery, which is recently imbrowned. You are struck by their distinct liquid green, as if they had but just sprung up there. All bright colors seem brighter now for the same reason, *i.e.*, from contrast with the duller browns and russets. The very cows on the hillside are a brighter red amid the pines and the brown hazels. The perfectly fresh spike of the *Polygonum amphibium* attracts every eye now. It is not past its prime. C. thinks it is exactly the color of some candy. Also the *Polygala sanguinea* on the bank looks redder than usual.

Many red maples are now partly turned dark crimson along the meadow-edge.

Near the pond we scare up twenty or thirty ducks, and at the pond three blue herons. They are of a hoary blue. One flies afar and alights on a limb of a large white pine near Well Meadow Head, bending it down. I see him standing there with outstretched neck.

Finding grapes, we proceeded to pluck them, tempted more by their fragrance and color than their flavor. though some were very palatable. We gathered many without getting out of the boat, as we paddled back, and more on shore close to the water's edge, piling them up in the prow of the boat till they reached to the top of the boat, – a long sloping heap of them and very handsome to behold, being of various colors and sizes, for we even added green ones for variety. Some, however, were mainly green when ripe. You cannot touch some vines without bringing down more single grapes in a shower around you than you pluck in bunches, and such as strike the water are lost, for they do not float. But it is a pity to break the handsome clusters.

Thus laden, the evening air wafting the fragrance of the cargo back to us, we paddled homeward. The cooler air is so clear that we see [Venus](#) plainly some time before sundown. The wind had all gone down, and the water was perfectly smooth. The sunset was uncommonly fair. Some long amber clouds in the horizon, all on fire with gold, were more glittering than any jewelry. An Orient city to adorn the plates of an annual could not be contrived or imagined more gorgeous. And when you looked with head inverted the effect was increased tenfold, till it seemed a world of enchantment. We only regretted that it had not a due moral effect on us scapegraces.

Nevertheless, when, turning my head, I looked at the willowy edge of Cyanean Meadow and onward to the sober-colored but fine-grained Clamshell Hills, about which there was no glitter, I was inclined to think that the truest beauty was that which surrounded us but which we failed to discern, that the forms and colors which adorn our daily life, not seen afar in the horizon, are our fairest jewelry. The beauty of Clamshell Hill, near at hand, with its sandy ravines, in which the cricket chirps. This is an Occidental city, not less glorious than that we dream of in the sunset sky.

It chanced that all the front-rank polygonum, with its rosaceous spikes, was drowned by the flood, but now, the sun having for some time set, with our backs to the west we saw the light reflected from the slender clear white spikes of the *P. hydropiperoides* (now in its prime), which in large patches or masses rise about a foot above the surface of the water and the other polygonum. Under these circumstances this polygonum was very pretty and interesting, only its more presentable part rising above the water.

Mr. Warren brings to me three kinds of birds which he has shot on the Great Meadows this afternoon, *viz.* two *Totanus flavipes*, such as I saw the 8th (there were eight in the flock, and he shot seven), one *Rallus Carolinus*, and one peewee. I doubt if I have seen any but the *T. flavipes* here, since I have measured this. [Or very likely I have. *Vide* 25th.] Wilson says that this does not penetrate far inland, though he sees them near Philadelphia after a northeast storm.

The above rail corresponds to the land rail or corncrake of Europe in form and habits. In Virginia is called the sora; in South Carolina, the coot. It is the game rail of the South, and the only species of the genus *Crex* in America. Note *kuk kuk kuk*. Go to Hudson's Bay and thereabouts to breed. This was a male, having a black throat and black about base of bill. Peabody says that they are seen here only in the autumn on their return from the north, though Brewer thinks their nest may be found here. In the genus *Crex*, the bill is stout and shorter than the head. In *Rallus* (as in *R. Virginianus*), it is longer than the head and slender. In the latter, too, the crown and whole upper parts are black, streaked with brown; the throat, breast, and belly, orange-brown; sides and vent, black tipped with white; legs and feet, dark red-brown; none of which is true of the *R. Carolinus*.

ASTRONOMY

ASTRONOMY

I notice that the wing of the peetweet, which is about two inches wide, has a conspicuous and straight-edged white bar along its middle on the under side for half its length. It is seven eighths of an inch wide and, being quite parallel with the darker parts of the wing, it produces that singular effect in its flying which I have noticed. This line, by the way, is not mentioned by Will Or son, yet it is, perhaps, the most noticeable mark of the bird when flying! The under side of the wings is commonly slighted in the description, though it is at least as often seen by us as the upper. Wilson says that "the whole lower parts are beautifully marked with roundish spots of black, ... but the young-are pure white below." May I not have made the young the *T. solitarius*? But the young are white-spotted on wings.

I think that I see a white-throated sparrow this afternoon.

September 19, Sunday: [Welborn Beeson](#) confided to his diary that "This morning at four o'clock Mother [[Ann Welborn Beeson](#)] was up and saw a [comet](#). We all got up and saw it plain about three points East of North, a few feet above the horizon. I have not seen an account of it in the papers or Almanacs."¹⁷¹



SKY EVENT

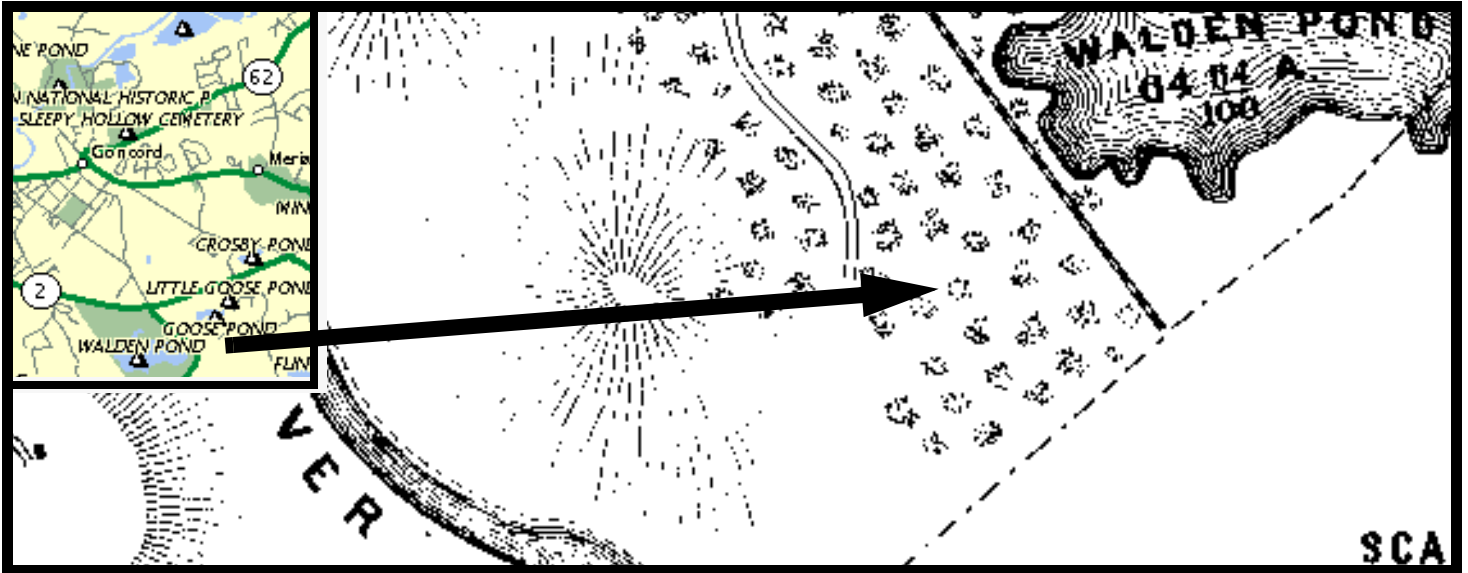


September 19, Sunday: P. M.– To Cassandra Ponds.

171. "COMET DONATI, (C/1858 L1=1858 VI). Followed with the unaided eye from mid-August until the end of November, T=1858 September 30. Comet occupied a unique position in the heavens during much of its apparition. Discovered in the evening sky. From the beginning of August until the 1st week in October in conjunction with, but located well north of, the Sun. From August 15th onward, seen with the naked eye both after sunset and before sunrise, growing steadily brighter. In the opening of September, 3rd magnitude with a short tail. At mid month, 2nd magnitude, situated in the feet of Ursa Major with a 4 degree tail. By month's end, zero to 1st magnitude, tail up to 20 degrees long. The first half of October, while crossing Bootes & Serpens, very spectacular, with a head brighter than Arcturus and a huge, gently curving tail up to 60 degrees long. Comet detected telescopically in daylight. Moved rapidly southeastward, dropping below the horizon about mid month. Followed in the Southern Hemisphere with the unaided eye until the end of November."

ASTRONOMY

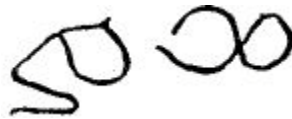
ASTRONOMY



We go through Sedge Hollow. See a small hole, perhaps a skunk's, in that hollow, and, about the mouth, fragments of a hornets' or wasps' nest. I knew that foxes were said to tear in pieces these nests for the sake of the grubs or old hornets left in them. Perhaps the skunk does.

These dry, sedgy hollows are peculiar and interesting to me. The fine, thick sedge makes a soft bed to recline on, and is recurved and lodging like a curly head. These dry hollows, side by side with the deeper and wet ones, are surrounded by hazel bushes and panicked andromeda instead of alders and willows. There is this sort of analogy to the wet ones, or ponds. In the lowest part, even here, I perceive that a different and coarser kind of sedge grows. Along the middle and bottom of the hollows is the indistinct trail of wild animals—foxes, etc.—and sportsmen. C. thinks this might be called Fox Path.

As I stand on the shore of the most westerly Cassandra Pond but one, I see in the air between me and the sun those interesting swarms of minute light-colored gnats,¹⁷² looking like motes in the sun. These may be allied to the winter gnat of Kirby and Spence. Do they not first appear with cooler and frosty weather, when we have had a slight foretaste of winter? Then in the clear, cool air they are seen to dance. These are about an eighth of an inch long, with a greenish body and two light-colored plumes in front; the wings not so long as the body. So I think they are different from those over the river in the spring. I see a dozen of these choirs within two or three rods, their centres about six feet above the surface of the water andromeda. These separate communities are narrow horizontally and long vertically, about eighteen inches wide and densest in the middle, regularly thinning to nothing at the edges. These individuals are constantly gyrating up and down, cutting figures of 8 like the water-bug, but keeping nearly about the same place. It is to me a very agreeable reminder of cooler weather.



Hear a chewink's *chewink*. But how ineffectual is the note of a bird now! We hear it as if we heard it not, and forget it immediately. In spring it makes its due impression, and for a long time will not have done echoing, as it were, through our minds. It is even as if the atmosphere were in an unfavorable condition for this kind of music. Every musician knows how much depends on this. Going through low woods I see a white, dusty or mealy-looking mildew on the leaves, —oaks, etc.,— the effects of the dog-days or mould season.

172. Apparently male *Tipulidae* or crane-flies. *Vide* LIBRARY OF ENTERTAINING KNOWLEDGE, "[Insect Transformations](#)," p. 363.



ASTRONOMY

ASTRONOMY

September 27, Monday: The 1st successful photograph of a [comet, VI Donati](#), by a portrait artist named Usherwood upon Walton Common in England. He exposed a collodion plate for 7 seconds through a f/2.4 fixed ratio portrait lens, and captured not only the inner coma but also the tail.

Forebodings of a coming storm were in the air, in everyone's hearts and minds and mouths. Every natural phenomenon was clothed with peculiar significance. The great comet that flamed across the heavens was taken as a sign of approaching war. Strange celestial lights, which nightly illuminated the heavens for weeks with a lurid brazen glow, the like of which had never been seen before by the people; filled their minds with morbid dread. Every one seemed on an intense strain. The slightest incident shattered the nerves.

ASTRONOMY

September 28, Tuesday: The second photograph of the [comet VI Donati](#), but not so successful as the first. George Phillips Bond exposed a Daguerreotype plate for six minutes through the f/15 refractor at the [Harvard Observatory](#) and got an image of the inner coma but no hint of the tail.

Forebodings of a coming storm were in the air, in everyone's hearts and minds and mouths. Every natural phenomenon was clothed with peculiar significance. The great comet that flamed across the heavens was taken as a sign of approaching war. Strange celestial lights, which nightly illuminated the heavens for weeks with a lurid brazen glow, the like of which had never been seen before by the people; filled their minds with morbid dread. Every one seemed on an intense strain. The slightest incident shattered the nerves.

ASTRONOMY



September 28, Tuesday: P. M.—To Great Fields via Gentian Lane. The gentian (*Andrewsii*), now generally in prime, loves moist, shady banks, and its transcendent blue shows best in the shade and suggests coolness; contrasts there with the fresh green; — a splendid blue, light in the shade, turning to purple with age. They are particularly abundant under the north side of the willow-row in Merrick's pasture. I count fifteen in a single cluster there, and afterward twenty at Gentian Lane near Flint's Bridge, and there were other clusters below. Bluer than the bluest sky, they lurk in the moist and shady recesses of the banks.

Acalypha is killed by frost, and rhexia.

Liatrix done, apparently some time. When Gosnold and Pring and Champlain coasted along our shores, even then the small shrub oak grew on the mainland, with its pretty acorns striped dark and light alternately.¹⁷³

173. The black oak acorns also slightly marked thus.

September 30, Thursday: [Donati's comet](#) made its closest approach to Sol and began its journey outward.

SKY EVENT



September 30, Thursday: A large flock of grackles amid the willows by the riverside, or chiefly concealed low in the buttonbushes beneath them, though quite near me. There they keep up their spluttering notes, though somewhat less loud, methinks, than in spring. These are the first I have seen, and now for some time, I think, the redwings have been gone. These are the first arrivers from the north where they breed.

I observe the peculiar steel-bluish purple of the nightshade, i. e. the tips of the twigs, while all beneath is green, dotted with bright berries, over the water. Perhaps this is the most singular color of any autumnal tint. It is almost black in some lights, distinctly steel-blue in the shade and contrasting with the green beneath, but, seen against the sun, it is a rich purple, its veins full of fire. The form of the leaf, too, is peculiar.

The pearly everlasting is an interesting white at present. Though the stem and leaves are still green, it is dry and unwithering like an artificial flower. Its white flexuous stem and branches, too, like wire wound with cotton. Its amaranthine quality is instead of high color. Neither is there any scent to betray it. Its very brown centre now affects us as a fresh and original color. It monopolizes a small circle, in the midst of sweet-fern perchance, on a dry hillside.

I see undoubtedly the little dipper by the edge of the pads this afternoon, and I think I have not seen it before this season. It is much smaller than I have seen this season, and is hard to detect even within four or five rods. It warily dives and comes up a rod or two further off amid the pads, scarcely disturbing the surface.

The wind is northerly these afternoons, blowing pretty strong early in the afternoon, so that I can sail up the stream; but later it goes down, leaving the river glassy smooth, and only a leaping fish or an insect dimples it or makes a sparkle on it.

Some young black cherry leaves are completely changed some time to their deep cherry-red. Also they are rather dull, but beneath quite lively, like the juice of a freshly crushed cherry.

In our late walk on the Cape, we entered Gloucester each time in the dark at mid-evening, travelling partly across lots till we fell into a road, and as we were simply seeking a bed, inquiring the way of villagers whom we could not see, the town seemed far more homelike to us than when we made our way out of it in the morning. It was comparatively still, and the inhabitants were sensibly or poetically employed, too, and then we went straight to our chamber and saw the moonlight reflected from the smooth harbor and lighting up the fishing vessels, as if it had been the harbor of Venice. By day we went remarking on the peculiar angles of the bevelled roofs, of which there is a remarkable variety there. There are also many large, square, three-story houses with short windows in the upper story, as if the third story were as good as a gig for respectability. When entering the town in the moonlight we could not always tell whether the road skirted the back yards or the front yards of the houses, and the houses did not so impertinently stare after the traveller and watch his coming as by day.

Walking early in the day and approaching the rocky shore from the north, the shadows of the cliffs were very distinct and grateful and our spirits were buoyant. Though we walked all day, it seemed the days were not long enough to get tired in. Some villages we went through or by without communicating with any inhabitant, but saw them as quietly and distantly as in a picture.

October: A brilliant [comet](#) that would be known to astronomers as [VI Donati](#) and to the general public as the [Great Comet of 1858](#), which had been being observed through telescopes since June 2nd and had been visible to the naked eye since August 19th, reached its point of greatest visibility on October 13th. Measurements indicated that the plane of polarization of the light of VI Donati intersected the comet and the sun — which amounted to a confirmation that at least some of the reflected light of a comet originated with the sun, thus destroying the theory that comets were entirely self-luminous like the sun rather than merely reflecting light like our moon.



Forebodings of a coming storm were in the air, in everyone's hearts and minds and mouths. Every natural phenomenon was clothed with peculiar significance. The great comet that flamed across the heavens was taken as a sign of approaching war. Strange celestial lights, which nightly illuminated the heavens for weeks with a lurid brazen glow, the like of which had never been seen before by the people; filled their minds with morbid dread. Every one seemed on an intense strain. The slightest incident shattered the nerves.

ASTRONOMY

October 1, Friday: In Syracuse, New York, the 7th annual “Jerry Celebration” sponsored by the Unitarian congregation of the Reverend Samuel Joseph May, honoring the freeing of Jerry McHenry from the federal marshals who had been seeking to “return” him to his “owner” on October 1, 1851.

[Henry Thoreau](#) wrote in his journal:



October 1: P.M.— To Hubbard's Close. Clintonia Maple Swamp is very fair now, especially a quarter of a mile off, where you get the effect of the light colors without detecting the imperfections of the leaves. Look now at such a swamp, of maples mixed with the~ evergreen pines, at the base of a pine-clad hill, and see their yellow and scarlet and crimson fires of all tints, mingled and contrasted with the green. Some maples are yet green, only yellow-tipped on the edges of their flakes, as the edges of a hazelnut bur. Some are wholly brilliant scarlet, raying out regularly and finely every way. Others, of more regular form, seem to rest heavily, flake on flake, like yellow or scarlet snow-drifts.

The cinnamon ferns are crisp and sour [?] in open grounds.

The fringed gentians are now in prime. These are closed in the afternoon,¹⁷⁴ but I saw them open at 12 M. a day or two ago, and they were exceedingly beautiful, especially when there was a single one on a stem. They who see them closed, or in the afternoon only, do not suspect their beauty.

Viola lanceolata again.

See larks in small flocks.

Was overtaken by a sudden gust and rain from the west. It broke off some limbs and brought down many leaves. Took refuge in Minott's house at last. He told me his last duck-shooting exploit for the fifth or sixth time. Says that Jake Potter, who died over eighty some dozen years since, told him that when he was a boy and used to drive his father Ephraim's cows to pasture in the meadows near Fair Haven, after they were mown in the fall, returning with them at evening, he used to hear the wildcats yell in the Fair Haven woods.

Minott tells of a great rise of the river once in August, when a great many “marsh-birds,” as peeps, killdeers, yellow-legs, etc., came inland, and he saw a flock of them reaching from Flint's Bridge a mile down-stream over the meadows, and making a great noise. Says the “killdees” used to be common here, and the yellowlegs, called “humilities,” used commonly to breed here on the tussocks in the meadows. He has often found their nests.

Let a full-grown but young cock stand near you. How full of life he is, from the tip of his bill through his

174. No. *Vide* forward.

CAT

trembling wattles and comb and his bright eye to the extremity of his clean toes! How alert and restless, listening to every sound and watching every motion! How various his notes, from the finest and shrillest alarum as a hawk sails over, surpassing the most accomplished violinist on the short strings, to a hoarse and terrene voice or cluck! He has a word for every occasion; for the dog that rushes past, and partlet cackling in the barn. And then how, elevating himself and flapping his wings, he gathers impetus and air and launches forth that world-renowned ear-piercing strain! not a vulgar note of defiance, but the mere effervescence of life, like the bursting of a bubble in a wine-cup. Is any gem so bright as his eye?

The elms are now great brownish-yellow masses hanging over the street. Their leaves are perfectly ripe. I wonder if there is any answering ripeness in the lives of those who live beneath them. The harvest of elm leaves is come, or at hand.

The cat sleeps on her head! What does this portend? It is more alarming than a dozen comets. How long prejudice survives! The big-bodied fisherman asks me doubtingly about the comet seen these nights in the northwest, – if there is any danger to be apprehended from that side! I would fain suggest that only he is dangerous to himself.

COMET

CAT

October 2, Saturday: [Donati's comet](#) was at this point brighter than the star Arcturus, which it was approaching, and its tail was 25 degrees in length.

ASTRONOMY



October 2: A dark and windy night the last. It is a new value when darkness amounts to something positive. Each morning now, after rain and wind, is fresher and cooler, and leaves still green reflect a brighter sheen.

Minott told me yesterday that he had never seen the seashore but once, and that was Noddle's Island in the War of 1812.

The garden is alive with migrating sparrows these mornings. The cat comes in from an early walk amid the weeds. She is full of sparrows and wants no more breakfast this morning, unless it be a saucer of milk, the dear creature. I saw her studying ornithology between the corn-rows.

CAT



Dakota women studying ornithology in their cornfields, per Captain Seth Eastman of Fort Snelling

As I approached Perch Pool the other day, half a dozen frogs leaped into it and buried themselves in the mass of callitriche at the bottom. I stood looking for perch a minute or two, when one after another up came the frogs from out the callitriche, just as a piece of cork would rise by mere buoyancy to the surface; and then, by a distinct effort, they let go all, drop anchor, elevate or let float up their heels, and lie spread out on the surface. They were probably *Rana fontinalis*.

Sailed to [Baker Farm](#) with a strong northwest wind. Got a peck of the small long-bunched grapes now turned purple under Lee's Cliff. One or two vines bear very plentifully. The bunches are about six inches long by one and a half, and quite dense and cylindrical commonly. They are now apparently just in their prime, to judge from color. Considerably later than the *Vitis Labrusca* [fox grape; "mother a nice jelly of them afterward"], but are not good. A large chocolate-colored puffball "smokes."

JAMES BAKER



ASTRONOMY

ASTRONOMY

October 3, Sunday: The Reverend [William Rounseville Alger](#) delivered an address at the funeral of the Reverend Stephen Lovell. (This would soon be printed in Boston as ADDRESS AT THE FUNERAL OF REV. STEPHEN LOVELL, OCT. 3, 1858 ... WITH AN OBITUARY NOTICE OF THE SAME BY WINSLOW LEWIS, by the firm of John Wilson and Son.)



October 3: One brings me this morning a Carolina rail alive, this year's bird evidently from its marks. He saved it from a cat in the road near the Battle-Ground. On being taken up, it pecked a little at first, but was soon quiet. It staggers about as if weak on my windowsill and pecks at the glass, or stands with its eyes shut, half asleep, and its back feathers hunched up. Possibly it is wounded. I suspect it may have been hatched here. Its feet are large and spreading, qualifying it to run on mud or pads. Its crown is black, but chin white, and its back feathers are distinctly edged with white in streaks. I compare my hazelnuts gathered some time ago. The beaked are pointed nuts, while the common are blunt; and the former are a much paler brown, also have a yellower and much sweeter meat.

A fringed gentian, plucked day before yesterday, at length, this forenoon, untwists and turns its petals partially, in my chamber.

Have noticed a very brilliant scarlet blackberry patch within a week.

The red maples which changed first, along the river, are now faded and partly fallen. They look more pink. But others are lit, and so there is more color than before. Some particular maple among a hundred will be of a peculiarly bright and pure scarlet, and, by its difference of tint and intenser color, attract our eyes even at a distance in the midst of the crowd. Looking all around Fair Haven Pond yesterday, where the maples were glowing amid the evergreens, my eyes invariably rested on a particular small maple of the purest and intensest scarlet.

P. M.—Paddle about Walden.

As I go through the Cut, I discover a new locality for the crotalaria, being attracted by the pretty blue-black pods, now ripe and dangling in profusion from these low plants, on the bare sandy and gravelly slope of the Cut. The vines or plants are but half a dozen times longer (or higher) than the pods. It was the contrast of these black pods with the yellowish sand which betrayed them.

How many men have a fatal excess of manner! There was one came to our house the other evening, and behaved very simply and well till the moment he was passing out the door. He then suddenly put on the airs of a well-bred man, and consciously described some arc of beauty or other with his head or hand. It was but a slight flourish, but it has put me on the alert.

It is interesting to consider how that crotalaria spreads itself, sure to find out the suitable soil. One year I find it on the Great Fields and think it rare; the next I find it in a new and unexpected place. It flits about like a flock of sparrows, from field to field.

The maples about Walden are quite handsome now. Standing on the railroad, I look across the pond to Pine Hill, where the outside trees and the shrubs scattered generally through the wood glow through the green, yellow, and scarlet, like fires just kindled at the base of the trees, — a general conflagration just fairly under way, soon to envelop every tree. The hillside forest is all aglow along its edge and in all its cracks and fissures, and soon the flames will leap upward to the tops of the tallest trees. About the pond I see maples of all their tints, and black birches (on the southwest side) clear pale yellow; and on the peak young chestnut clumps and walnuts are considerably yellowed.

I hear, out toward the middle, or a dozen rods from me, the plashing made apparently by the shiners, — for they look and shine like them, — leaping in schools on the surface. Many lift themselves quite out for a foot or two, but most rise only part way out, — twenty black points at once. There are several schools indulging in this sport from time to time as they swim slowly along. This I ascertain by paddling out to them. Perhaps they leap and dance in the water just as gnats dance in the air at present. I have seen it before in the fall. Is it peculiar to this season?

Hear a hylodes peeping on shore.

A general reddening now of young and scrub oaks. Some chinquapin bright-red. White pines fairly begin to change. The large leaves of some black oak sprouts are dark-purple, almost blackish, above, but greenish beneath. See locust leaves all crisped by frost in Laurel Glen Hollow, but only part way up the bank, as on the shore of a lake.

October 5, Tuesday: The false nucleus of Donati's Comet passed only 20 arc-minutes to the south of the star Arcturus, of similar brightness, and it would be noticed that that star would continue to shine unimpeded through the tenuous 35-degree tail of this [comet](#). The broad dust tail was curving like a scimitar across the heavens, while two delicate straight streaks, evidently of its gas trail, were of similar length.

CAT

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An unidentified arsonist torched New-York's Crystal Palace, destroying the building and \$2,000,000 worth of art. (Editor and exhibition commissioner [Horace Greeley](#) would be arrested in Paris and temporarily put in Clichy prison in an attempt to coerce damages for statuary destroyed in the fire.)



October 5: I still see large flocks, apparently of chipbirds, on the weeds and ground in the yard; without very distinct chestnut crowns, and they are divided by a light line. They are eating seeds of the *Amaranthus hybridus*, etc.

8 A.M. – I go to Hubbard's Close to see when the fringed gentians open. They begin to open *in the sun* about 8.30 A.M., or say 9.

Chewink note still. Grackles in flocks. *Phebe* note of chickadee often these days.

Much green is indispensable for maples, hickories, birches, etc., to contrast with, as of pines, oaks, alders, etc. The former are fairest when seen against these. The maples, being in their prime, say yesterday, before the pines, are conspicuously parti-colored.

P.M. – To Easterbrooks Country.

White pines in low ground and swamps are the first to change. Some of these have lost many needles. Some on dry ground have so far changed as to be quite handsome, but most only so far as to make the misty glaucous (green) leaves more soft and indefinite. The fever-bush is in the height of its change and is a showy clear lemonyellow, contrasting with its scarlet berries. The yellow birch is apparently at the height of its change, clear yellow like the black. I think I saw a white ash which was all turned clear yellowish, and no mulberry, in the Botrychium Swamp.

Looking on the Great Meadows from beyond Nathan Barrett's, the wool-grass, where uncut, is very rich brown, contrasting with the clear green of the portions which are mown; all rectangular.

The staghorn sumach apparently in the prime [Queried in pencil] of its change.

In the evening I am glad to find that my phosphorescent wood of last night still glows somewhat, but I improve it much by putting it in water. The little chips which remain in the water or sink to the bottom are like so many stars in the sky.

The comet makes a great show these nights. Its tail is at least as long as the whole of the Great Dipper, to whose handle, till within a night or two, it reached, in a great curve, and we plainly see stars through it.¹⁷⁵

Huckleberry bushes generally red, but dull Indian-red, not scarlet.

The red maples are generally past their prime (of color). They are duller or faded. Their first fires, like those of genius, are brightest. In some places on the edges of swamps many of their tops are bare and smoky. The dicksonia fern is for the most part quite crisp and brown along the walls.

October 7, Thursday: Frederick Douglass prepared resolutions for a public meeting on [capital punishment](#) held at Rochester, New York, that included various Quakers among its attendees, and [Susan B. Anthony](#). In effect, his argument was:

Murder is no cure for murder.

Resolved, That life is the great primary and most precious and comprehensive of all human rights— that whether it be coupled with virtue, honour, or happiness, or with sin, disgrace and misery, the continued possession of it is rightfully not a matter of violation; that it is neither deliberately nor voluntarily destroyed, either by individual separately, or combined in what is called Government; that it is a right derived solely and directly from God –the source of all goodness and the centre of all authority– and is most manifestly designed by Him to be held, esteemed, and revered among men as the most sacred, solemn and inviolable of all his gifts to man.

Resolved, That the love of man as manifested in his actions to his fellows, whether in his public or private relations, has

¹⁷⁵. It finally reaches between one fourth and one third from the horizon to the zenith.



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very been the surest test of the presence of God in the soul; that the degree in which the sacredness of human life has been exemplified in all ages of the world, has been the truest index of the measure of human progress; that in proportion as the tale of barbarism has receded, a higher regard has been manifested for the God-given right to life, its inviolability has been strengthened in proportion to the development of the intellect and moral sentiments, and that conscience, reason, and revelation unite their testimony against the continuance of a custom, barbarous in its origin, antichristian in its continuance, vindictive in its character, and demoralizing in its tendencies.

Resolved, That any settled custom, precept, example or law, the observance of which necessarily tends to cheapen human life, or in any measure serves to diminish and weaken man's respect for it, is a custom, precept, example, and law utterly inconsistent with the law of eternal goodness written on the constitution of man by his Maker, and is diametrically opposed to the safety, welfare and happiness of mankind; and that however ancient and honorable such laws and customs may be in the eyes of prejudice, superstition and bigotry, they ought to be discountenanced, abolished and supplanted by a higher civilization and a holier and more merciful Christianity.

Resolved, That in the opinion of this meeting, when a criminal is firmly secured in the iron grasp of the government, and on that account can no longer endanger the peace and safety of society; that when he is wasted and emaciated by heavy chains and horrid thoughts, and long confinement in a gloomy cell - when, as it is often the case, he is completely transformed, both in temper and spirit- the execution of the death penalty on such an one is an act of cold blooded and barbarous enormity, and is as cowardly as it is cruel, and that instead of repressing and preventing the horrid crime of murder, it really serves by shocking and blunting the finer and better feelings of human nature, to undermine respect for human life, and leads directly to the perpetration of the crime which it would extinguish.

Resolved, That the time to advance opinions and principles is when those opinions and principles are upon trial, and threatened with outrage; and that while we have respectfully remained silent till the ends of justice have been served in fixing the guilt of the criminal, we now come in the sacred office of humanity and benevolence, to appeal for mercy at the hands of his Excellency, Governor King, on behalf of young Ira Stout, and to ask that his punishment shall be commuted from being capitally executed to imprisonment for life.

Resolved, That punishment as such, is a form of revenge, wreaking upon the criminal the pain he has inflicted on another, wrong in principle and pernicious in practice; arises out of the lowest propensities of human nature, and is opposed to the highest civilization: that it has no sanction in the spirit and teachings of Christ, which everywhere abound in loving kindness and forgiveness.

Resolved, That rather than visit the crime upon the head of the criminal, thus descending to his level, we ought to place him in a position to develop his higher nature; and instead of descending to a spirit of revenge, and degrading ourselves on



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one hand, and the criminal on the other, we should urge a thorough reform in our criminal laws – basing them on the truly Christian principle of love and good will towards men, and to reject forever the cold blooded and barbarous principle of retaliation.

Resolved, That a copy of the foregoing resolutions and the proceedings of this meeting, be transmitted to his Excellency, Governor King, as an expression of the sense of this meeting, and that the same be subscribed by the Chairman and Secretary thereof.






October 8, Friday: [William Cooper Nell](#) presented the address at the 20th anniversary of the First Independent Baptist Female Society in the Joy Street Church of Boston.



October 8: Fine pasture grass, seen in the sun, begins to look faded and bleached like the corn. Strong northwest wind. The button-bushes and black willows are rapidly losing leaves, and the shore begins to look Novemberish. Mulberry leaves of ash are apparently dulled.

October 10, Sunday: At this point [Donati's comet](#) was closest to the earth, at half an astronomical unit in distance. Its dust trail, also of about half an astronomical unit in length, reached 60 degrees across the sky.

SKY EVENT

[Henry Thoreau](#) was far from the only one staring at this magnificent object in the heavens. John Hedges from Hampstead, London, aboard a ship sailing from England toward Australia, had been keeping a journal which upon arrival he would copy out in ink and mail as a letter to his mother back home. He and his wife and children had left the Mersey River in September, in a berth right next to a gang of Irish. On [Christmas Day](#) the body of a 12-year-old passenger would be consigned to the sea, and the coast of Australia would be sighted. On the 4th of January, 1859, his own son would die, and his first task ashore would be the burial of this child. But on this day, a Sunday, John was jotting down news of the [comet VI Donati](#) to which Thoreau had been referring on September 23d,  September 29th,  October 1st,  and October 5th,  and to which he would again be referring on November 1st:  “A beautiful day, we have averaged 8½ miles per hour since yesterday. (A nautical day commences at noon and ends at noon the next day.) Captain read prayers today. We still see the Comet every night but we cannot see it so many hours as we could a week ago, the Mate told me today that we were 1800 miles on our voyage....”

Forebodings of a coming storm were in the air, in everyone's hearts and minds and mouths. Every natural phenomenon was clothed with peculiar significance. The great comet that flamed across the heavens was taken as a sign of approaching war. Strange celestial lights, which nightly illuminated the heavens for weeks with a lurid brazen glow, the like of which had never been seen before by the people; filled their minds with morbid dread. Every one seemed on an intense strain. The slightest incident shattered the nerves.

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October 10, Sunday: P. M. — To Annursnack.

November has already come to the river with the fall of the black willow and the button-bush, and the fall and blackening of the pontederia. The leaves of the two former are the greater part fallen, letting in the autumn light to the water, and the ducks have less shelter and concealment.

As I go along the Groton road, I see afar, in the middle of E. Wood's field, what looks like a stone jug or post, but my glass reveals it a woodchuck, a great, plump gray fellow, and when I am nearly half a mile off, I can still see him nibbling the grass there, and from time to time, when he hears, perchance, a wagon on the road, sitting erect and looking warily around for approaching foes. I am glad to see the woodchuck so fat in the orchard. It proves that is the same nature that was of yore.

The autumnal brightness of the foliage generally is less, or faded, since the fading of the maples and hickories, which began about the 5th.¹⁷⁶ Oak leaves generally (perhaps except scarlet?) begin to wither soon after they begin to turn, and large trees (except the scarlet) do not generally attain to brilliancy.¹⁷⁷

Apparently *Fringilla pusilla* yet.

The *Salix humilis* leaves are falling fast in Wood Turtle Path (A. Hosmer's), a dry wood-path, looking curled and slaty-colored about the half-bare stems. Thus each humble shrub is contributing its mite to the fertility of the globe. I find the under sides of the election-cake fungi there covered with pink-colored fleas, apparently poduras, skipping about when it is turned up to the light.

The simplest and most lumpish fungus has a peculiar interest to us, compared with a mere mass of earth, because it is so obviously organic and related to ourselves, however mute. It is the expression of an idea; growth according to a law; matter not dormant, not raw, but inspired, appropriated by spirit. If I take up a handful of earth, however separately interesting the particles may be, their relation to one another appears to be that of mere juxtaposition generally. I might have thrown them together thus. But the humblest fungus betrays a life akin to my own. It is a successful poem in its kind. There is suggested something superior to any particle of matter, in the idea or mind which uses and arranges the particles.

Genius is inspired by its own works; it is hermaphroditic.

I find the fringed gentian abundantly open at 3 and at 4 P. M., — in fact, it must be all the afternoon, — open to catch the cool October sun and air in its low position. Such a dark blue! surpassing that of the male bluebird's back, who must be encouraged by its presence.¹⁷⁸

The indigo-weed, now partly turned black and broken off, blows about the pastures like the flyaway grass.

I find some of those little rooty tubers (?), now woody, in the turtle field of A. Hosmer's by Eddy Bridge.

Pulling up some *Diplopappus liniifolius*, now done, I find many *bright-purple* shoots, a half to three quarters of an inch long, freshly put forth underground and ready to turn upward and form new plants in the spring.

October 13, Wednesday: On this night the [Great Comet of 1838](#), which had visible to the naked eye for some time, reached its point of greatest general visibility. However, it was raining in Concord.

Forebodings of a coming storm were in the air, in everyone's hearts and minds and mouths. Every natural phenomenon was clothed with peculiar significance. The great comet that flamed across the heavens was taken as a sign of approaching war. Strange celestial lights, which nightly illuminated the heavens for weeks with a lurid brazen glow, the like of which had never been seen before by the people; filled their minds with morbid dread. Every one seemed on an intense strain. The slightest incident shattered the nerves.



October 13: Rain, all day, more or less, which the cloudy and rather still yesterday threatened. Elm

176. But the oaks became brighter. *Vide* 15th.

177. [Queried in pencil.]

178. Inclosing it in a mass of the sphagnum near or in which it often grows, I carry it home, and it opens for several days in succession.

leaves thickly strew the street now and rattle underfoot,—the darkbrown pavement. The elms are at least half bare.

November 8, Sunday: Last naked-eye observation of [Donati's comet](#).

SKY EVENT



November 8: P. M. – To Boulder Field.

Goodwin, laying wall at Miss Ripley's, observed to me going by, "Well, it seems that ——— thought that he had lived long enough." He committed suicide within a week, at his sister's house in Sudbury. A boy slept in the chamber with him, and, hearing a noise, got [up] and found on the floor with both his jugular veins cut, but his windpipe whole. He said to the boy, "Take the razor and cut deeper," but the boy ran, and ——— died, and Garfield said it was about time, for ———, in revenge for being sent to the house of correction, had set fire to a pile of wood of his, that long pile by the roadside beyond William Wheeler's, that I stood under in a rain once. ——— probably burned Witherell's house too, and perhaps Boynton's stable.

The red osier at Mrs. Simmons's is quite bare; how long? Her hawthorn is still quite leafy and pretty, yellow-brown, dotted. A thorn at Hall's fence is dark scarlet and pretty. There are many leaves on the buckthorn still. Common thorn bushes, long since bare, when many grow together in clumps, make another such a smoke, though smaller, as the maples, — the same color. I can often distinguish the bush by this. Alders are a very dark gray, sort of iron gray, and, if near enough, you see dark lines (the stems) and specks (the fruit) like cinders, like a very dense, dark, and unconsumed uliginous smoke, in which many cinders rise.

Those trees and bushes which grow in dense masses and have many fine twigs, being bare, make an agreeable misty impression where there are a myriad retreating points to receive the eye, not a hard, abrupt wall; just as, in the sky, the visual ray is cushioned on clouds, unless it is launched into the illimitable ether. The eye is less worn and wearied, not to say wounded, by looking at these mazes where the seer is not often conscious of seeing anything. It is well that the eye is so rarely caught and detained by any object in one whole hemisphere of its range, *i.e.* the sky. It enjoys everlasting holiday on this side. Only the formless clouds and the objectless ether are presented to it. For they are nervous who see many faces in the clouds. Corresponding to the clouds in the sky are those mazes now on the earth. Nature disposes of her naked stems so softly as not to put our eyes out. She makes them a smoke, or stationary cloud, on this side or that, of whose objective existence we rarely take cognizance. She does not expect us to notice them. She calls our attention to the maple swamp more especially in October.

There is also the coarse maze produced by an oak wood (when nearly all the leaves are fallen), in which, however, the large boughs reflecting the light have considerable distinctness, and that of the forest in general. I thought, from a small specimen, that the brushy yellow birch tops were of the same hue with the alders. [*Vide* November 11th] Nature has many scenes to exhibit, and constantly draws a curtain over this part or that. She is constantly repainting the landscape and all surfaces, dressing up some scene for our entertainment. Lately we had a leafy wilderness, now bare twigs begin to prevail, and soon she will surprise us with a mantle of snow.¹⁷⁹ Some green she thinks so good for our eyes, like blue, that she never banishes it entirely, but has created evergreens.

It is remarkable how little any but a lichenist will observe on the bark of trees. The mass of men have but the vaguest and most indefinite notion of mosses, as a sort of shreds and fringes, and the world in which the lichenist dwells is much further from theirs than one side of this earth from the other. They see bark as if they saw it not. These objects which, though constantly visible, are rarely looked at are a sort of eye-brush.

Each phase of nature, while not invisible, is yet not too distinct and obtrusive. It is there to be found when we look for it, but not demanding our attention. It is like a silent but sympathizing companion in whose company we retain most of the advantages of solitude, with whom we can walk and talk, or be silent, naturally, without the necessity of talking in a strain foreign to the place.

I know of but one or two persons with whom I can afford to walk. With most the walk degenerates into a mere vigorous use of your legs, ludicrously purposeless, while you are discussing some mighty argument, each one having his say, spoiling each other's day, worrying one another with conversation, hustling one another with our conversation. I know of no use in the walking part in this case, except that we may seem to be getting on together toward some goal; but of course we keep our original distance all the way. Jumping every wall and ditch with vigor in the vain hope of shaking your companion off. Trying to kill two birds with one stone, though they sit at opposite points of [the] compass, to see nature and do the honors to one who does not.

Animals generally see things in the vacant way I have described. They rarely see anything but their food, or some real or imaginary foe. I never saw but one cow looking into the sky.

Lichens as they affect the scenery, as picturesque objects described by [Gilpin](#) or others, are one thing; as they concern the lichenist, quite another.

179. I read that snow fell two or three inches deep in Bangor yesterday morning.



These are the various grays and browns which give November its character. There are also some red mazes, like the twigs of the white maple and our Cornus sericea, etc. (the red osier, too, further north), and some distinct yellow ones, as willow twigs, which are most interesting in spring. The silvery abeles are steadily falling nowadays. The chalky white under side of these leaves is remarkable. None of our leaves is so white.

I think I admire again about this time the still bright-red or crimson fruit of the sumach, now when not only its own but most other leaves have fallen and there are few bright tints, it is now so distinct on its twigs. Your attention is not distracted by its brilliant leaves now.

I go across N. Barrett's land and over the road beyond his house. The aspect of the Great Meadows is now nearly uniform, the new and exposed grass being nearly as brown and sere as that which was not cut. Thus Nature has been blending and harmonizing the colors here where man had interfered.

I wandered over bare fields where the cattle, lately turned out, roamed restless and unsatisfied with the feed; I dived into a rustling young oak wood where not a green leaf was to be seen; I climbed to the geological axis of elevation and clambered over curly-pated rocks whose strata are on their edges, amid the rising woods; and again I thought, They are all gone surely, and left me alone. Not even a man Friday remains. What nutriment can I extract from these bare twigs? Starvation stares me in the face. "Nay, nay!" said a nuthatch, making its way, head downward, about a bare hickory close by. "The nearer the bone the sweeter the meat. Only the superfluous has been swept away. Now we behold the naked truth. If at any time the weather is too bleak and cold for you, keep the sunny side of the trunk, for there is a wholesome and inspiring warmth such as the summer never afforded. There are the winter mornings, with the sun on the oak wood tops. While buds sleep, thoughts wake." ("Hear! hear!" screamed the jay from a neighboring copse, where I had heard a tittering for some time.) "Winter has a concentrated and nutty kernel if you know where to look for it." And then the speaker shifted to another tree, further off, and reiterated his assertions, and his mate at a distance confirmed them; and I heard a suppressed chuckle from a red squirrel that heard the last remark, but had kept silent and invisible all the while. Is that you? "Yes-sir-ee," said he. Then, running down a slanting bough, he called out rather impudently, "Look here! just get a snug-fitting fur coat and a pair of fur gloves like mine, and you may laugh at a northeast storm," and then he wound up with a slang phrase, in his own lingo, accompanied by a flourish of his tail, just as a newsboy twirls his fingers with his thumb on his nose and inquires, "Does your mother know you are out?"

The wild pear tree on Ponkawtasset has some yellow leaves still. The now more noticeable green radical leaves of the buttercup in the russet pastures remind me of the early spring to come, of which they will offer the first evidence. Now, too, I can see (for the same reason) where grows our only patch of broom, a quarter of a mile off, it [is] such a distinct, somewhat yellowish, green. Already the creeping juniper is a ripe glaucous green, with a distinct ruddy tinge to the upper surface, – the whole bush a ripe tint like a fruit.

I stand in Ebby Hubbard's yellow birch swamp, admiring some gnarled and shaggy picturesque old birches there, which send out large knee-like limbs near the ground, while the brook, raised by the late rain, winds fuller than usual through the rocky swamp. I thought with regret how soon these trees, like the black birches that grew on the hill near by, would be all cut off, and there would be almost nothing of the old Concord left, and we should be reduced to read old deeds in order to be reminded of such things, – deeds, at least, in which some old and revered bound trees are mentioned. These will be the only proof at last that they ever existed. Pray, farmers, keep some old woods to match the old deeds. Keep them for history's sake, as specimens of what the township was. Let us not be reduced to a mere paper evidence, to deeds kept in a chest or secretary, when not so much as the bark of the paper birch will be left for evidence, about its decayed stump.

The sides of the old Carlisle road where it is low and moist are (and have for a long time been), for many rods together and a rod in width, brown or cinnamon-colored with the withered dicksonia fern, not-like the brown of trees (their withered leaves), but a peculiar cinnamon-brown. The bare huckleberry bushes and the sweet-ferns are draped with them as a kind of mourning.

Solidago puberula still out, for you see a few bright-yellow solidago flowers long after they are generally turned to a dirty-white fuzzy top. Pratt says he saw a few florets on a *Polygala sanguinea* within a week. He shows me samphire, plucked three weeks ago in Brighton, when it was a very brilliant crimson still.

Looking from Pratt's window at sunset, I saw that purple or rosy light reflected from some old chestnut rails on the hilltop before his house. Methinks it is pinkish, even like the old cow-droppings in the pastures. So universally does Nature blush at last. The very herbage which has gone through the stomachs and intestines of the cow acquires at last a faint pinkish tinge.

The button-bush balls are now blackish (really dark-brown) and withered, looking much blacker against the light than a month ago.

November 30, Tuesday: [Henry Thoreau](#) provided us with his reasons for presuming that the "respectable Christianity" of his fellow Christians contained no worthy religiosity, but instead the most shameful cover story masking self-worship:



November 30: The shrike was very violent for a long time, beating itself against the bars of its cage at Stacy's. To-day it is quiet and has eaten raw meat. Its plain dark ash-colored crown and back are separated by a very distinct line from the black wings. It has a powerful hawk-like beak, but slender legs and claws. Close to, it looks more like a muscicapa than anything.

P. M.— To Walden with Channing, and Fair Haven Hill.

It is a pleasant day and the snow melting considerably. We stand on the Pout's Nest, now frozen, with snow ice added to the old, so that it will bear,—a coarse frozen white batter,—and the hills around are covered with snow, though Walden is open. It is a perfect winter scene. This withdrawn but ample recess in the woods, with all that is necessary for a human residence, yet never referred to by the *London Times* and *Galvani's Messenger*, as some of those arctic bays are. Some are hastening to Europe and some to the West Indies, but here is a bay never steered for. These nameless bays where the *Times* and *Tribune* have no correspondent are the true bays of All Saints for me. Green pines on this side, brown oaks on that, the blue sky overhead, and this white counterpane all around. It is an insignificant fraction of the globe which England and Russia and the filibusters have overrun. The open pond close by, though considerably rippled to-day, affects me as a peculiarly mild and genial object by contrast with this frozen pool and the snow-covered shore, and I sit down on the shore in the sun, on the bare rocks. There seems to be a milder air above it, as the water within it is milder.

Going westward through Wheeler's Owl Wood toward Weird Dell, Well Meadow Field, I beheld a peculiar winter scene, seen many times before but forgotten. The sun, rather low, is seen through the wood with a cold, dazzling white lustre, like that of burnished tin reflected from the silvery needles of the pines. No powerful light streams through, but you stand in the quiet and somewhat sombre aisles of a forest cathedral, where cold green masses alternate with pale-brown but warm leather-colored ones, almost ruddy (you are inclined to call them red). [Reddish-tawny (?).] These are the internal decorations, while dark trunks, streaked with snow, rise on all sides, and a pure white floor stretches around, and perhaps a single patch of yellow sunlight is seen on the white shaded floor.

The short afternoons are come. Yonder dusky cloudmass in the northwest will not be wafted across the sky before yonder sun that lurks so low will be set. We see purple clouds in the east horizon.

But did ever clouds flit and change, form and dissolve, so fast as in this clear, cold air? For it is rapidly growing colder, and at such a time, with a clear air and wind and shifting clouds, I never fail to see mother-o'-pearl tints abundant in the sky.

We see the tracks of a hunter and his hounds who have gone along the path from the Dell to the Cliffs. The dog makes a genuine track with his five toes, an honest dog's track, and if his master went barefoot we should count five toe-prints in his track too, and they would be seen to resemble each other remotely; but now we see only I Reddish-tawny (?). the track of a boot, and I thought the dog must be disgusted to tread in it. Walking thus where a man and two dogs had recently passed along, making a trail only a few inches wide, treading in one another's tracks alternately, the impression was that they had constantly crowded on one another, though in fact the dogs may have been a quarter of a mile ahead [of] or behind their master. The dog rosette identical [with that] which is spotted all over Greece. They go making these perfect imperfect [sic] impressions faster than a Hoe's cylinder power-press.

Coming over the side of Fair Haven Hill at sunset, we saw a large, long, dusky cloud in the northwest horizon, apparently just this side of Wachusett, or at least twenty miles off, which was snowing, when all the rest was clear sky. It was a complete snow-cloud. It looked like rain falling at an equal distance, except that the snow fell less directly and the upper outline of a part of the cloud [was] more like that of a dusky mist. It was [not] much of a snow-storm, just enough to partially obscure the sight of the mountains about which it was falling, while the cloud was apparently high above them, or it may have been a little this side. The cloud was of a dun color, and at its south end, near where the sun was just about to set, it was all aglow on its under side with a salmon fulgor, making it look warmer than a furnace at the same time that it was snowing. In short, I saw a cloud, quite local in the heavens, whose south end rested over the portals of the day, twenty and odd miles off, and was lit by the splendor of the departing sun, and from this lit cloud snow was falling. It was merely an extensive flurry, though it may have lasted twenty minutes.

I have seen a dark cloud as wide as the sky rolling up from the northwest and blasting all my hopes, at sight of which I have dismissed the sun for three weeks and resigned myself to my fate. But when, after being absorbed in other meditations, I have looked round for that cloud half an hour after, I have distinguished only an indistinct white film far in the southeast which only added to the glory of the day by reflecting its light.

The river may be said to have frozen generally last night.

That was a remarkable prospect from the side of Fair Haven Hill just before the sun set, a strong cold northwest wind blowing, and as good a winter prospect as the arctic regions present,—the brilliant Blessed Isles already gathered about the portals of the day, and mother-o'-pearl clouds forming and dissolving in the crisped air between the zenith and the west horizon, while at least twenty miles off (at first thirty) in the northwest a vast dark dun-colored cloud whose southern end overlapped the setting sun, a glowing canopy, was snowing on the mountains seen dimly beneath it. It was a rare and strange sight, that of a snow-storm twenty miles off on the verge of a perfectly clear sky. Thus local is all storm, surrounded by serenity and beauty. The terrestrial mountains were made ridiculous beneath that stupendous range. I said to my companion, "There comes a storm

DOG



VENUS

FERNE

which will cover the earth four feet deep. Make haste and do your necessary work before the night comes.” But before we had got home I saw it in the east still further off, –not having seen it pass us,– a pale ethereal film, almost dissolved in the sky, as indistinct as a fabulous island. In these clear, cold days fear no cloud. They vanish and dissolve before the cloud-consuming air. This air snaps them up like a dog his meat.

Bare hickories now seen over the shining surface of the snow suggest a cold equal to that of the Cold Friday. As I go up the hill eastward while the sun is setting, I see a tinge of green reflected from its surface under my face, and the scattered clouds in the east are greener yet.

C. thought that if he lived in Weird Dell –which I talked of buying– he should come and sit on the northwest side every night and see the shadows steal gradually across it.

Just before the sun disappeared we saw, just in the edge of the horizon westward from Acton, maybe eight miles off, a very brilliant fire or light, just like a star of the first magnitude or a house burning without smoke, and this, though so far and so brilliant, was undoubtedly only the sun reflected from some gilt weathercock there. So incredibly brilliant are all surfaces now. It was pure flame, larger than a house, precisely as if the planet [Venus](#) rested in the horizon’s edge. Possibly the weathercock was nearer, but we both concluded that it was not. The sun seen setting through the snow-carpeted woods, with shimmering pine-needles or dark-green masses and warm brown oak leaves for screens. With the advent of snow and ice, so much cold white, the browns are warmer to the eye. All the red that is in oak leaves and huckleberry twigs comes out.

A cloud, then, which glows high above the portals of the day seven or eight minutes before the sun disappears, may be some twenty miles off only.

Neither England nor America have any right to laugh at that sentence in the rare book called “The Blazon of Gentry,” written by a zealous student of heraldry, which says after due investigation that “Christ was a gentleman, as to the flesh, by the part of his mother, ... and might have borne coat-armor. The apostles also were gentlemen of blood, and many of them descended from that worthy conqueror Judas Machabeus; but, through the tract of time, and persecution of wars, poverty oppressed the kindred and they were constrained to servile works.” Whatever texts we may quote or commentaries we may write, when we consider the laws and customs of these two countries we cannot fail to perceive that the above sentence is perfectly of a piece with our practical commentary on the New Testament. The above is really a pertinent reason offered why Christianity should be embraced in England and America. Indeed, it is, accordingly, only what may be called “respectable Christianity” that is at all generally embraced in the two countries.

I read that a woman picked a pint of ripe red raspberries at Bunker Hill Cliff, where they get the Quincy granite, October 1st, this year.¹⁸⁰

There is a late greenness accompanied by a few yellow flowers, a November greenness, methinks, corresponding to the early greenness of the spring and its blossoms. Early in November (and late in October) lycopodiums and evergreen ferns (the small botrychium sheds pollen then, as well as several lycopodiums) have their day, under the yellow flowers of the witch-hazel and amid a few lingering goldenrods, as in spring green radical leaves are associated with alder and willow blossoms. The cold greens have their day so late in the fall. I do not speak so much of a lingering verdure, but of one which then is most flourishing and, you may say, greenest before the lichen days have come.

I cannot but see still in my mind’s eye those little striped breams poised in Walden’s glaucous water. They balance all the rest of the world in my estimation at present, for this is the bream that I have just found, and for the time I neglect all its brethren and am ready to kill the fatted calf on its account. For more than two centuries have men fished here and have not distinguished this permanent settler of the township. It is not like a new bird, a transient visitor that may not be seen again for years, but there it dwells and has dwelt permanently, who can tell how long? When my eyes first rested on Walden the striped bream was poised in it, though I did not see it, and when Tahatawan paddled his canoe there. How wild it makes the pond and the township to find a new fish in it! America renews her youth here. But in my account of this bream I cannot go a hair’s breadth beyond the mere statement that it exists, – the miracle of its existence, my contemporary and neighbor, yet so different from me! I can only poise my thought there by its side and try to think like a bream for a moment. I can only think of precious jewels, of music, poetry, beauty, and the mystery of life. I only see the bream in its orbit, as I see a star, but I care not to measure its distance or weight. The bream, appreciated, floats in the pond as the centre of the system, another image of God. Its life no man can explain more than he can his own. I want you to perceive the mystery of the bream. I have a contemporary in Walden. It has fins where I have legs and arms. I have a friend among the fishes, at least a new acquaintance. Its character will interest me, I trust, not its clothes and anatomy. I do not want it to eat. Acquaintance with it is to make my life more rich and eventful. It is as if a poet or an anchorite had moved into the town, whom I can see from time to time and think of yet oftener. Perhaps there are a thousand of these striped bream which no one had thought of in that pond, – not their mere impressions in stone, but in the full tide of the bream life.

Though science may sometimes compare herself to a child picking up pebbles on the seashore, that is a rare mood with her; ordinarily her practical belief is that it is only a few pebbles which are not known, weighed and measured. A new species of fish signifies hardly more than a new name. See what is contributed in the scientific reports. One counts the fin-rays, another measures the intestines, a third daguerreotypes a scale, etc., etc.;

180. Was it not November 1st?



otherwise there's nothing to be said. As if all but this were done, and these were very rich and generous contributions to science. Her votaries may be seen wandering along the shore of the ocean of truth, with their backs to that ocean, ready to seize on the shells which are cast up. You would say that the scientific bodies were terribly put to it for objects and subjects. A dead specimen of an animal, if it is only well preserved in alcohol, is just as good for science as a living one preserved in its native element.

What is the amount of my discovery to me? It is not that I have got one in a bottle, that it has got a name in a book, but that I have a little fishy friend in the pond. How was it when the youth first discovered fishes? Was it the number of their fin-rays or their arrangement, or the place of the fish in some system that made the boy dream of them? Is it these things that interest mankind in the fish, the inhabitant of the water? No, but a faint recognition of a living contemporary, a provoking mystery. One boy thinks of fishes and goes a-fishing from the same motive that his brother searches the poets for rare lines. It is the poetry of fishes which is their chief use; their flesh is their lowest use. The beauty of the fish, that is what it is best worth the while to measure. Its place in our systems is of comparatively little importance. Generally the boy loses some of his perception and his interest in the fish; he degenerates into a fisherman or an ichthyologist.¹⁸¹

Thoreau also doubted that our “scientists” were in pursuit of truth, suspecting that according to their behavior they must be in pursuit of something other than truth:

Her votaries may be seen wandering along the shores of the ocean of truth, with their backs to that ocean, ready to seize on the shells which are cast up. You would say that the scientific bodies were terribly put to it for objects and subjects. A dead specimen of an animal, if it is only well preserved in alcohol, is just as good for science as a living one preserved in its native element.

This was because Thoreau recognized that he was thinking of a bream as

a little fishy friend in the pond

a living contemporary

and

a provoking mystery.

Generally, his concern was for the character that was formed in this process, by the emerging “scientist,” that:

Generally the boy loses some of his perception and his interest in the fish; he degenerates into a fisherman or an ichthyologist.

The bream, appreciated, floats in the pond as the centre of the system, another image of God. Its life no man can explain more than he can his own. I want you to perceive the mystery of the bream. I have a contemporary in Walden.

181. *Vide* pages 363, 364.

1859

Professor [Benjamin Peirce](#) made the prescient suggestion that the development and change of the tails of [comets](#), and the [Aurora Borealis](#) that flickered at the poles of the earth, might be due to one common and as yet undetected solar cause. (Now, of course, we are aware of the high-velocity streams of ionized particles being thrown off by the corona of the sun.)



SKY EVENT

H.L. Fizeau of France performed an experiment to determine how the velocity of light through water would differ were the water flowing. He found there to be a difference: when the velocity of the flowing water was changed, the velocity of light through it changed about half as much.

HISTORY OF OPTICS

1859: Guerre d'Italie - Société d'Anthropologie de Paris - Adoption du projet Labrouste pour le réaménagement de la Bibliothèque impériale Hugo : La Légende des siècles - Mistral : Mireille - Nouveau dictionnaire de la langue française de Pierre Larousse - De l'origine des espèces de Darwin Jean Jaurès (†1914) - Anatole Le Braz (†1926) - Gustave Kahn (†1936) - Pierre Curie (†1896) - Charles Henry (†1926)

When [comet Biela](#) was supposed to appear during this year, neither of its two nuclei were seen and this was attributed to their poor position for observation in the skies.

SKY EVENT

ASTRONOMY

ASTRONOMY

A 5-inch [Alvan Clark](#) refractor telescope was purchased with funds contributed by the women of America, and presented to [Maria Mitchell](#).



ASTRONOMY



"The needle is the chain of woman, and has fettered her more than the laws of the country."

— Professor [Maria Mitchell](#)



January 9, Sunday forenoon: At Mountain Ash in Glamorganshire, Wales a number of persons, including members of the clergy, had a shower of live little fishes fall upon them during a rainstorm and wind. Ten minutes later, there was another such shower of little fishes. The largest one measured by the Reverend John Griffith was 5 inches in length.



January 9: At sundown to Walden.

Standing on the middle of Walden I see with perfect distinctness the form and outlines of the low hills which surround it, though they are wooded, because they are quite white, being covered with snow, while the woods are for the most part bare or very thin-leaved. I see thus the outline of the hills eight or ten rods back through the trees. This I can never do in the summer, when the leaves are thick and the ground is nearly the same color with them. These white hills are now seen as through a veil of stems. Immediately after the wood was cut off, this outline, of course, was visible at all seasons, but the wood, springing up again, concealed it, and now the snow has come to reveal the lost outline.

The sun has been set some minutes, and as I stand on the pond looking westward toward the twilight sky, a soft, satiny light is reflected from the ice in flakes here and there, like the light from the under side of a bird's wing. It is worth the while to stand here at this hour and look into the soft western sky, over the pines whose outlines are so rich and distinct against the clear sky. I am inclined to measure the angle at which [a] pine bough meets the stem. That soft, still, cream-colored sky seems the scene, the stage or field, for some rare drama to be acted on.

C. says the winter is the sabbath of the year. The perfect winter days are cold, but clear and bright.

ASTRONOMY

ASTRONOMY

January 29, Saturday: [William Cranch Bond](#) died in Cambridge, Massachusetts.

HARVARD OBSERVATORY

ASTRONOMY

Harper's Weekly offered a woodcut having to do with [opium](#), the poor child's nurse:



ASTRONOMY

ASTRONOMY

February 26, Saturday: In the midst of a storm of controversy, the Board of Overseers of the Corporation promoted [George Phillips Bond](#) to fill his father's shoes as Director of the [Harvard Observatory](#), and appointed him to



be the Phillips Professor of Astronomy. The nominee of the “Lazzaroni,” a pressure group in science which has been sarcastically referred to as “the sacred brotherhood,” had been not Bond but [Benjamin Peirce](#), the Perkins Professor of Astronomy and Mathematics at [Harvard College](#).¹⁸²

ASTRONOMY

In the evening [William John Broderip FRS](#) was writing “On the Shark” for [Fraser's Magazine](#) and broke off in the middle of a sentence.

182. The core group of the “Lazzaroni” consisted of Professors [Louis Agassiz](#) and Benjamin Peirce of [Harvard](#), and Professor Benjamin Athorp Gould (1824-1896) of Dudley Observatory in Albany NY, plus [Alexander Dallas Bache](#) of the American Academy of Arts and Sciences in Washington DC. According to Edward Lurie, Agassiz's biographer (LOUIS AGASSIZ. Chicago IL: U of Chicago P, 1960), what they were trying to do was “control the institutional forms of science in America.” The core agenda of this group was to set itself astride all channels of funding in such a manner as to take charge of what research was feasible and important and who could be relied upon to dependably perform this research. They were playing hardball: their machinations included spreading invidious and false whispers about the accuracy of the observations of the Bonds, wherever possible boycotting their membership in scientific bodies, wherever possible alleging the priority of the discoveries of others, and by the back door seizing control of government funding. For one instance, the cheap secret processes of the creation of the National Academy of Sciences in 1863. The prime offense committed at the [Harvard Observatory](#), which so enraged the “sacred brotherhood,” seem to have consisted in the fact that since these astronomers were working to all intents and purposes for free, by financing themselves out of the cash drawer of the timekeeper manufacturing firm of William Bond & Son in [Boston](#), therefore, practically, they had unwittingly placed themselves outside the ordinary spheres of influence of these conspirators and were in a position to treat most of their machination with Christian condescension, as if they amounted to nothing more than “water off a duck's back.” The machinations of this group had at one point come close to destroying the Dudley Observatory.

March 2, Wednesday: Headmaster [Caleb G. Forshey](#) and four of his Texas Military Institute cadets at Ruttersville in Fayette County were able to trace the zodiacal band as it “reached entirely across the sky” from the western horizon, through Gemini and Leo, all the way to the foot of Virgo near the eastern horizon.

ASTRONOMY



[Henry Thoreau](#) delivered his lecture “AUTUMNAL TINTS” before a Concord audience containing, among others, Waldo and Lidian Emerson, Edward Emerson, and Franklin Benjamin Sanborn. According to a record made by Ellen Emerson, “Father said there were constant spontaneous bursts of laughter and Mr Thoreau was applauded.” According to a letter from Franklin Benjamin Sanborn to the Reverend Theodore Parker, either Emerson or Sanborn or both considered the lecture to be “as good as anything he ever wrote,” in fact downtown-quality material, fit for the reverend’s Sunday religious entertainments in the Boston Music Hall.

In his journal, [Thoreau](#) made a record of his afternoon activities:




March 2, Wednesday: P.M.—To Cassandra Ponds and down river.

It is a remarkably cold day for March, and the river, etc., are frozen as solidly as in the winter and there is no water to be seen upon the ice, as usually in a winter day, apparently because it has chiefly run out from beneath on the meadows and left the ice, for often, as you walk over the meadows, it sounds hollow under your tread. I see in the Deep Cut, on the left-hand, or east, side, just beyond the clay, a ravine lately begun, in a slightly different manner from the Clamshell one. The water running down the steep sand-bank (which is some thirty or thirty-five feet high), it being collected from the field above, had worn a channel from four to six inches wide, gradually, through the frozen crust of the sand, which was one to two feet thick, and, reaching the loose unfrozen sand beneath, had washed it downward, and out through the narrow channel lower down, until quite a cavern was formed, whose bottom was eight or ten feet below the surface, while it was five or six feet wide. But within a few days the crust, thawing, had fallen in, and so the cavern, with its narrow “crack,” or skylight, was turned into an open ravine, and there is no telling where the mischief will end.

The willow catkins by the railroad where you first come in sight of the [*sic*] have now all (on one or two bushes) crept out about an eighth of an inch, giving to the bushes already a very pretty appearance when you stand on the sunny side, the silvery-white specks contrasting with the black scales. Seen along the twigs, they are somewhat like small pearl buttons on a waistcoat. Go and measure to what length the silvery willow catkins have crept out beyond their scales, if you would know what time o’ the year it is by Nature’s clock.

As I go through the Cassandra Ponds, I look round on the young oak woods still clad with rustling leaves as in winter, with a feeling as if it were their last rustle before the spring, but then I reflect how far away still is the time when the new buds swelling will cause these leaves to fall. We thus commonly antedate the spring more than any other season, for we look forward to it with more longing. We talk about spring as at hand before the end of February, and yet it will be two good months, one sixth part of the whole year, before we can go a-maying. There may be a whole month of solid and uninterrupted winter yet, plenty of ice and good sleighing. We may not even see the bare ground, and hardly the water, and yet we sit down and warm our spirits annually with this distant prospect of spring. As if a man were to warm his hands by stretching them toward the rising sun and rubbing them. We listen to the February cock-crowing and turkey-gobbling as to a first course, or prelude.

The bluebird [**Eastern Bluebird**  *Sialia sialis*] which some woodchopper or inspired walker is said to have seen in that sunny interval between the snowstorms is like a speck of clear blue sky seen near the end of a storm, reminding us of an ethereal region and a heaven which we had forgotten. Princes and magistrates are often styled serene, but what is their turbid serenity to that ethereal serenity which the bluebird embodies? His Most Serene Birdship! His soft warble melts in the ear,— as the snow is melting in the valleys around. The bluebird comes and with his warble drills the ice and sets free the rivers and ponds and frozen ground. As the sand flows down the slopes a little way, assuming the forms of foliage where the frost comes out of the ground, so this little rill of melody flows a short way down the concave of the sky. The sharp whistle of the blackbird, too, is heard like single sparks or a shower of them shot up from the swamps and seen against the dark winter in the rear.

Under the alders at Well Meadow I see a few skunk-cabbage spathes fairly open on the side, and these may bloom after a day or two of pleasant weather. But for the most part, here and generally elsewhere, the spathes are quite small, slender, and closed as yet, or frostbitten. The caltha leaves have grown decidedly. They make nearly a handful in one place, above the surface of the springy water, the leaves not yet quite flatted out, but curled up into a narrow ellipse. They barely peep above the water. Also what I take to be a kind of cress is quite fresh-looking, as if it had grown a little there. The chrysosplenium may have looked as it does, even under the snow, or all winter (?). It already, at any rate, makes pretty (dirty) green beds, about level with the surface of the water. These plants (i. e. first ones) are earlier than any pads, for the brooks, and ditches even, are generally



ASTRONOMY

ASTRONOMY

frozen over still, firmly.



ASTRONOMY

ASTRONOMY

On this day Robert Barnett of Lincoln County, Kentucky brought his black slaves America Barnett, a 47-year-old woman 5 feet 3 inches in height, and Sam Barnett 4 feet 10 inches in height, who is presumably her 10-year-old son, across the Ohio River to Cincinnati, to have Judge George H. Hilton declare each from that day “entitled to all the privileges of a free person of color in this State or elsewhere”:

MANUMISSION

Plas at the Court House in Cincinnati, in the County of Hamilton, and State of Ohio, of the Hamilton County Probate Court, within and for said County, at a session thereof held at the place aforesaid, on the Second day of March in the year of our Lord, one thousand eight hundred and fifty three, before the Hon^{ble} George H. Hilton sole Judge of said Court.

THE STATE OF OHIO, } ss.
HAMILTON COUNTY.

Be it Remembered, That at a session of the Probate Court, within and for said County, held at the Court House in Cincinnati, on the second day of March in the year of our Lord, one thousand eight hundred and fifty three, before the Hon^{ble} George H. Hilton sole Judge of said Court, the following amongst other proceedings were then and there had, to wit:



In the matter of the Emancipation
of America Barnett

This day comes into open Court Robert Barnett, of the County of Lincoln and State of Kentucky, and brought with him into Court his slave America Barnett, and at the same time executed a deed of Emancipation to the said America Barnett, which is now found by the Court to be well executed; And the Court also finds from the testimony of Green Barnett that said Robert Barnett was the legal owner of said America Barnett according to the laws of the State of Kentucky, - the Court therefor finds that said America Barnett is absolutely a free person of color in this State or elsewhere, and orders said deed to be recorded.

And now the said deed is here recorded, which is in the words and figures to wit:

Deed

Know all Men that I Robert Barnett of the County of Lincoln in the State of Kentucky, being now in the City of Cincinnati, State of Ohio, in consideration of one dollar to me paid and for other good and sufficient considerations, me thereunto moving, do by these presents emancipate and set free my negr girl America Barnett aged forty seven years (47 years) of black color, five feet and three inches (5 feet 3 inches)

high in such manner that the said America Barnett,
 and all issue which shall be born of her body shall
 forever hereafter be absolutely free -
 In testimony whereof I have hereunto set my hand
 and seal at Cincinnati this 2^d March A.D. 1859
 his
 Robert Barnett 
 mark
 Signed and sealed
 in presence of us
 Green Barnett
 Edw. Crapsey
 The State of Ohio ss.
 Hamilton County ss.
 Personally appeared before
 me Probate Judge within and for said County
 Robert Barnett and acknowledged the signing
 and sealing of the foregoing deed of Emancipation
 to be his voluntary act and deed for the uses &
 purposes therein expressed -
 In testimony whereof I have
 hereunto set my hand and
 the seal of said Court at Cincin-
 nati this 2^d March A.D. 1859.
 Geo. H. Heclton
 Probate Judge


The freedom papers of the 10-year-old Sam are much the same, with appropriate substitutions:

In the matter of the Emancipation
 of Sam Barnett ss.
 This day, comes in-
 to open Court Robert Barnett, of the County of Lin-
 coln and State of Kentucky and brought with him
 into Court his slave Sam Barnett, and at the same

We note that the white man who is doing this manumitting cannot sign his name:

Of course all the appropriate legal cover documents also were signed and sealed — so that in this land of the free and home of the brave, these Americans could actually, hoggamus higgamus, **belong to themselves**:

MANUMISSION

March 4, Friday: Final telescopic observation of [comet Donati](#).

The body of [William John Broderip](#) was interred at Kensall Green Cemetery near the body of his friend Robert Brown the botanist, whose death had preceded his by only a few months (he had never married).

SKY EVENT



March 4: Began to snow last evening, and it is now (early in the morning) about a foot deep, and raining.

P.M.—To E. Hosmer Spring. Down Turnpike and back by E. Hubbard's Close.

We stood still a few moments on the Turnpike below Wright's (the Turnpike, which had no wheel-track beyond Tuttle's and no track at all beyond Wright's), and listened to hear a spring bird. We heard only the jay screaming in the distance and the cawing of a crow [[American Crow](#) *Corvus brachyrhynchos*]. What a perfectly New England sound is this voice of the crow! If you stand perfectly still anywhere in the outskirts of the town and listen, stilling the almost incessant hum of your own personal factory, this is perhaps the sound which you will be most sure to hear rising above all sounds of human industry and leading your thoughts to some far bay in the woods where the crow is venting his disgust. This bird sees the white man come and the Indian withdraw, but it withdraws not. Its untamed voice is still heard above the tinkling, of the forge. It sees a race pass away, but it passes not away. It remains to remind us of aboriginal nature.

I find near Hosmer Spring in the wettest ground, which has melted the snow as it fell, little flat beds of light-green moss, soft as velvet, which have recently pushed up, and lie just above the surface of the water. They are scattered about in the old decayed trough. (And there are still more and larger at Brister's Spring.) They are like little rugs or mats and are very obviously of fresh growth, such a green as has not been dulled by winter, a very fresh and living, perhaps slightly glaucous, green. The myosotis and bitter cress are hardly clean and fresh enough for a new growth. [But the last is, at Well Meadow. Vide (5 MARCH).] The radical leaves of the Ranunculus repens are conspicuous, but the worse for the wear; but the golden saxifrage has in one or two places decidedly and conspicuously grown, like the cowslip at Well Meadow and still more, rising in dense beds a half to three quarters of an inch above the water, the leaves, like those of the cowslip, only partly concealed and flattened out. This distinguishes the fresh-springing leaves of these two. Probably there is more of the chrysosplenium thus advanced in Concord than of the caltha. [There is also at Well Meadow on the 5th.] I see none of the last here.

The surface of the snow thus rapidly melting and sinking (there are commonly some inches of water under it, the rain having soaked through), though still very fresh and pure white, is all cracked, as it were, like that of some old toadstools. It has sunk so much that every inequality in the surface of the ground beneath is more distinctly shown than when bare. The ruts of old wood-paths are represented in the surface a foot above, and the track of the man and of the dog that ran by the side of the team (in the old snow), — the thread, in short, of every valley. The surface of the snow, though so recent, is therefore, on account of the rain, very diversified. On steep slopes it is regularly furrowed, apparently by water that has flowed down it.

In the brook in Hubbard's Close I see the grass pushing up from the bottom four or five inches long and waving in the current, which has not yet reached the surface.

C. thinks this is called a sap snow, because it comes after the sap begins to flow.



ASTRONOMY

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**THE STATE OF OHIO, } SS. PROBATE COURT.
HAMILTON COUNTY.**

I, GEORGE H. HILTON, sole Judge and ex-officio Clerk of the Probate Court, within and for the County aforesaid, do hereby certify the foregoing to be a true transcript of the Record of the said Court in the matter of the Emancipation of America Barnett

as the same appear from the records and files of said Court.

In Testimony Whereof, I have hereunto set my hand and affixed the Seal of the said Court, at Cincinnati, this third day of March
A. D. 1869
Geo. H. Hilton
Probate Judge and ex-officio Clerk.

**THE STATE OF OHIO, } SS.
HAMILTON COUNTY.**

I, GEORGE H. HILTON, sole Judge of the Probate Court, within and for said County, hereby certify, that the signature attached to the above certificate, purporting to be that of George H. Hilton, is his genuine signature; and that he was at the time thereof, ex-officio Clerk of said Probate Court, and, as such, full faith and credit are due his acts.

Witness my hand and the Seal of said Court at Cincinnati, this third day of March
A. D. 1869
Geo. H. Hilton
Probate Judge.



ASTRONOMY

ASTRONOMY

The story goes that at the Social Club the other night Cyrus Stow, hearing that the lecture before the Lyceum by Alger was to be on “The Sophistry of Ennui” and not knowing what that was, asked in good faith if it went by wind or water.

SOCIAL CLUB

April 4: Headmaster [Caleb G. Forshey](#) and four of his Texas Military Institute cadets at Ruttersville in Fayette County were again able, as they had been able a month earlier on another clear night, to trace the zodiacal band as it “reached entirely across the sky” from the western horizon, through Gemini and Leo, all the way to the foot of Virgo near the eastern horizon.

ASTRONOMY



April 4. Clear, cold, and very windy; wind northwest.

For a fortnight past, or since the frost began to come out, I have noticed the funnel-shaped holes of the skunk in a great many places and their little mincing tracks in the sand. Many a grub and beetle meets its fate in their stomachs.

Methinks the peculiar and interesting *Brown Season*, of the spring lasts from the time the snow generally begins to go off—as this year the fore part of March—till the frost is generally (or entirely?) out. Perhaps it will be through the first week of April this year. Ordinary years it must be somewhat later. The surface of the earth is never so completely saturated with wet as during this period, for the frost a few inches beneath holds all the ice and snow that are melted and the rain, and an unusual amount of rain falls. All plants, therefore, that love moisture and coolness, like mosses and lichens, are in their glory, but also [?] I think that the very withered grass and weeds, being wet, are *blooming* at this season. The conspicuous reddish brown of the fallen brakes is very rich, contrasting with the paler brown of oak leaves.

Such an appetite have we for new life that we begin by nibbling the very crust of the earth. We betray our vegetable and animal nature and sympathies by our delight in water. We rejoice in the full rills, the melting snow, the copious spring rains and the freshets, as if we were frozen earth to be thawed, or lichens and mosses, expanding and reviving under this influence.

The osier bark now, as usual, looks very yellow when wet, and the wild poplar very green.

P.M. – To Cliffs.

Those striped snakes of the 30th were found (several in all) on west side the railroad causeway, on the sand, which is very warm. It would seem, then, that they come out in such places soon after the frost is out. The railroad men who were cutting willows there to set on the sides of the Deep Cut, to prevent the gullying there, came across them.

The epigæa looks as if it would open in two or three days at least, [Vide 12th.] – showing much color and this form:



The flower-buds are protected by the withered leaves, oak leaves, which partly cover them, so that you must look pretty sharp to detect the first flower. These plants blossom by main strength, as it were, or the virtue that is in them, –not growing by water, as most early flowers, –in dry copses.

I see several earthworms to-day under the shoe of the pump, on the platform. They may have come up through the cracks from the well where the warm air has kept them stirring.

On the barren railroad causeway, of pure sand, grow chiefly tallows, a few poplars, and sweet-fern and blackberry vines.

When I look with my glass, I see the cold and sheeny snow still glazing the mountains. This it is which makes the wind so piercing cold. There are dark and windy clouds on that side, of that peculiar brushy or wispy character –or rather like sheafs– which denotes wind. They only spit a little snow at last, thin and scarcely perceived, like falling gossamer.

August 28/29: As the sky became dark on this evening, it began to intrude on people's attentions that something truly strange was going on in the heavens. There were aurora borealis displays visible even as far south as the island of Cuba. The logs of ships sailing near the equator would reveal, when later collected together, entries having to do with crimson lights reaching halfway up the sky from the horizon toward the zenith. In [Baltimore](#), telegraph operators contended with such unexplained currents in their equipment that it took them two full hours, from 8PM to 10PM, to transmit a press report containing a mere 400 words. It would require a few days for scientists to begin to recognize the cause of this activity: intense [sunspots](#). [Caleb G. Forshey](#) made sketches of the skies over Rutgersville, Texas and described how "the whole sky, from Ursa Major to the zodiac in the east, was occupied by the streams or spiral columns ... over the same extent, was an exquisite roseate tint which faded and returned" and that "a stupendous pyramid of white light" was surrounded on either side by "a pyramid of rosy light."¹⁸³

ASTRONOMY



August 29. I hear in the street this morning a goldfinch sing part of a sweet strain. It is so cool a morning that for the first time I move into the entry to sit in the sun. But in this cooler weather I feel as if the fruit of my summer were hardening and maturing a little, acquiring color and flavor like the corn and other fruits in the field. When the very earliest ripe grapes begin to be scented in the cool nights, then, too, the first cooler airs of autumn begin to waft my sweetness on the desert airs of summer. Now, too, poets nib their pens afresh. I scent their first-fruits in the cool evening air of the year. By the coolness the experience of the summer is condensed and matured, whether our fruits be pumpkins or grapes. Man, too, ripens with the grapes and apples. I find that the water-bugs (Gyrinus) keep amid the pads in open spaces along the sides of the river all day, and, at dark only, spread thence all over the river and gyrate rapidly. For food I see them eating or sucking at the wings and bodies of dead devil's-needles which fall on the water, making them too gyrate in a singular manner. If one gets any such food, the others pursue him for it. There was a remarkable red aurora all over the sky last night. P. M.—To Easterbrooks Country. The vernonia is one of the most conspicuous flowers now where it grows, — a very rich color. It is somewhat past its prime; perhaps about with the red eupatorium. Botrychium lunarioides now shows its fertile frond above the shorn stubble in low grounds, but not shedding pollen. See the two-leaved Solomon's-seal berries, many of them ripe; also some ripe mitchella berries, contrasting with their very fresh green leaves. White cohush berries, apparently in prime, and the arum fruit. The now drier and browner (purplish-brown) looking rabbit's clover, whose heads collected would make a soft bed, is an important feature in the landscape; pussies some call them; more puffed up than before. The thorn bushes are most sere and yellowish-brown bushes now. I see more snakes of late, methinks, both striped and the small green. The slate-colored spots or eyes—fungi—on several kinds of goldenrods are common now. The knife-shaped fruit of the ash has strewn the paths of late.

183. Elias Loomis's "The Great Auroral Exhibition of Aug. 28th to Sept. 4th, 1859," [American Journal of Science](#), 2d Series, [XXIX](#) (March 1860) and [XXX](#) (November 1860).



ASTRONOMY

ASTRONOMY

September 1/2 night: At the Royal Observatory in Greenwich, London, England, Richard C. Carrington (1826-1875) and R. Hodgson were timing the drift of sunspots on a projected image of the [sun](#) at 11:18AM Greenwich Mean Time, when “two patches of intensely bright and white light broke out” and persisted for some five minutes (this was not only the initial recorded observation of a solar flare, but also the initial observation of a solar flare of this peculiar white-light variety).¹⁸⁴ In the skies over [Texas](#) on that night, an auroral display great magnificence was being viewed by [Caleb G. Forshey](#), and his observations would be published in the [American Journal of Science](#), along with accounts by Lieutenant Albert Miller Lea at Corpus Christi, Major Benjamin Franklin Rucker at Washington-on-the-Brazos, Francis Kellogg at Wheelock, and Dr. William Henry Gantt at Union Hill, in addition to a report from Dallas by its Mayor, John McClannahan Crockett.

What was happening all over the earth would need to be described as a magnetic storm. When the pulse of energy arrived from the sun, it interrupted telegraph service and created visible Aurora Borealis as far south as Havana, Hawaii, and Rome. Similar events occurred in the skies of the Southern Hemisphere. In the state of their knowledge at the time, these scientists of course refrained from instantly leaping to a causal relationship — but we now have a much better estimate of the major sun event that had just happened.

SUNSPOTS

SKY EVENT



September 1: P.M.—To Saw Mill Brook and Flint’s Pond.
That reach in the road this side Britton’s Camp might be called Nabalus Road, they are so abundant there. Some of them are fully six feet high, — a singularly tall and slender plant.
See, I think, my first tobacco-pipe this afternoon, now that they are about done, and have seen no pinesap this year, abundant as both the above were last year. Like fungi, these plants are apparently scarce in a dry year, so that you might at first think them rare plants. This is a phenomenon of drought.
I see in different places small grubs splitting leaves now, and so marking them curiously with light brown or whitish on the green. Here are two at work in a Rhus Toxicodendron leaf. They appear to have been hatched within the leaf at the apex, and each has eaten upward on its own side of the midrib and equally fast, making a light-colored figure shaped like a column of smoke in the midst of the green. They perfectly split the leaf, making no visible puncture in it, even at the ribs or veins. Some creatures are so minute that they find food enough for them between the two sides of a thin leaf, without injuring the cuticle. The ox requires the meadows to be shorn for him, and crones both blade and stalk, even of the coarsest grass, as corn; but these grubs do their browsing in narrower pastures, pastures not so wide as their own jaws, between fences (inviolable to them) of their own establishing, or along narrow lanes. There, secure from birds, they mine, and no harm can they do now that the green leaf has so commonly done its office.
If you would study the birds now, go where their food is, i. e. the berries, especially to the wild black cherries, elder-berries, poke berries, mountain-ash berries, and ere long the barberries, and for pigeons the acorns. In the sprout-land behind Britton’s Camp, I came to a small black cherry full of fruit, and then, for the first time for a long while, I see and hear cherry-birds [[Cedar Waxwing](#) [Bombycilla cedrorum](#)] — their shrill and fine seringo — and the note of robins, which of late are scarce. We sit near the tree and listen to the now unusual sounds of these birds, and from time to time one or two come dashing from out the sky toward this tree, till, seeing us, they whirl, disappointed, and perhaps alight on some neighboring twigs and wait till we are gone. The cherry-birds and robins seem to know the locality of every wild cherry in the town. You are as sure to find them on them now, as bees and butterflies on the thistles. If we stay long, they go off with a fling, to some other cherry tree, which they know of but we do not. The neighborhood of a wild cherry full of fruit is now, for the notes of birds, a little spring come back again, and when, a mile or two from this, I was plucking a basketful of elder-berries (for which it was rather early yet), there too, to my surprise, I came on a flock of golden robins and of bluebirds, apparently feeding on them. Excepting the vacciniums, now past prime and drying up, the cherries and elderberries are the two prevailing fruits now. We had remarked on the general scarcity and silence of the birds, but when we came to the localities of these fruits, there again we found the berry-eating birds assembled, — young (?) orioles and bluebirds at the elder-berries.
Green white pine cones are thrown down. An unusual quantity of these have been stripped for some time past, and I see the ground about the bases of the trees strewn with them.
The spikenard berries in the shade at Saw Mill have but just begun to turn. The Polygonatum biflorum with its row of bluish-green berries (the blue a bloom), pendulous from the axils of the recurved stem, apparently now in its prime. Red choke-berry ripe. Smooth sumach probably hardly ripe yet generally.

184. Richard C. Carrington’s “Description of a Singular Appearance seen in the Sun on September 1, 1859,” [Monthly Notices of the Royal Astronomical Society](#), XX (November 11, 1859), 13-15.



The fruit of the arum is the most remarkable that I see this afternoon, such its brilliancy, color, and form; perhaps in prime now. It is among the most easily detected now on the floor of the swamp, its bright-scarlet cone above the fallen and withered leaves and amid its own brown or whitish and withering leaves. Its own leaves and stem perhaps soft and decaying, while it is perfectly fresh and dazzling. It has the brightest gloss of any fruit I remember, and this makes the green ones about as remarkable as the scarlet. With, perchance, a part of the withered spathe still investing and veiling it. The scarlet fruit of the arum spots the swamp floor.

Now, also, bright-colored fungi of various colors on the swamp floor begin to compete with these fruits. I see a green one.

The elder-berry cyme, held erect, is of very regular form, four principal divisions drooping toward each quarter around an upright central one. Are said to make a good dye. They fill your basket quickly, the cymes are so large and lie up so light.

The autumnal dandelion is a prevailing flower now, but since it shuts up in the afternoon it might not be known as common unless you were out in the morning or in a dark afternoon. Now, at 11 A. M., it makes quite a show, yet at 2 P. M. I do not notice it.

Bought a pair of shoes the other day, and, observing that as usual they were only wooden-pegged at the toes, I required the seller to put in an extra row of iron pegs there while I waited for them. So he called to his boy to bring those zinc pegs, but I insisted on iron pegs and no zinc ones. He gave me considerable advice on the subject of shoes, but I suggested that even the wearer of shoes, of whom I was one, had an opportunity to learn some of their qualities. I have learned to respect my own opinion in this matter. As I do not use blacking and the seller often throws in a box of blacking when I buy a pair of shoes, they accumulate on my hands.

Saw this afternoon, on a leaf in the Saw Mill woodpath, a very brilliant beetle a quarter or a third of an inch in length with brilliant green and copper reflections. [Vide June 28th 1860.] The same surface, or any part of the upper surface, of the bug was green from one point of view and burnished copper from another. Yet there was nothing in its form to recommend this bug.

You must be careful not to eat too many nuts. I one winter met a young man whose face was broken out into large pimples and sores, and when I inquired what was the matter, he answered that he and his wife were fond of shagbarks, and therefore he had bought a bushel of them, and they spent their winter evenings eating them, and this was the consequence.

September 2, night: On the night of this day gas street lighting was being introduced to the Hawaiian Islands. Did the attention being paid to this new gas lighting interfere at all with the local experience of an unusual event, the aurora borealis? On this night the aurora borealis Northern Lights were being seen as far south as Rome and Cuba — and there are reports from Hawaii (there were similar effects around the South Pole). Despite the fact that the telegraph, as an invention, was only 15 years old, and thus the number of wires stretched across the landscape was still really minimal, telegraph lines were shorting out both in the United States and in Europe, and causing wildfires. What had happened was “the perfect space storm” — the strongest by far of which we presently have any knowledge, three times more powerful than any we have recently had the opportunity to measure. The sun had erupted and sent charged particles racing outward at an exceptionally high speed, in an expanding bubble of hot gas plasma, and the coronal mass ejection had been aimed straight at the earth. The magnetic field was exceptionally intense, and happened in this case to be aligned in such a manner as not to be neutralized at all by the earth’s normal magnetic field. Although your typical solar storm that we have been able to study using modern instruments needs 3 or 4 days to move from the sun to Earth, in this case the solar wind of plasma particles arrived very soon indeed after a strange powerful event involving numerous sunspots had been observed to be taking place on the surface of the sun on August 28th. Between August 28th and September 2d several solar flares had been observed, and then on September 1st, there was this truly massive flare. The amount of light normally put out in that region on the sun’s surface actually, for one minute, doubled.



ASTRONOMY

ASTRONOMY

Since light itself takes about 8 minutes to make the 93,000,000-mile journey from the sun, we calculate that the hot plasma particles made the journey in but 17 hours and 40 minutes! In March 1989 a relatively minor such bubble of sun plasma has shut down the Hydro-Quebec power to an entire Canadian province for more than 9 hours. In 1994 a solar storm caused two of our communications satellites to malfunction in a major way, disrupting newspaper, network television, and nationwide radio service throughout Canada. Other such storms have disrupted cellphone service and GPS systems. We have no grasp of how extensive the damage would be, in our present era of interconnectedness, should such a perfect storm occur again now, nor do we have any theoretical framework by which we might guesstimate either the occurrence or the magnitude of such solar events. All we know for sure is that an event of this magnitude is possible — because one such has already occurred.

AURORA BOREALIS

SKY EVENT

December 22: The Reverend [William Rounseville Alger](#) delivered an oration before the Reverend Theodore Parker's Fraternity in the Boston Music Hall, entitled "The historic purchase of freedom." (This would soon be published in Boston by the firm of Walker, Wise & Company as THE HISTORIC PURCHASE OF FREEDOM: AN ORATION DELIVERED BEFORE THE FRATERNITY, IN THE MUSIC HALL, BOSTON, DEC. 22, 1859, THE TWO HUNDRED AND THIRTY-NINTH ANNIVERSARY OF THE LANDING OF THE PILGRIMS AT PLYMOUTH.)

A country doctor and astronomy buff named Lescarbault of the village of Orgeres in France notified astronomical authorities that he had seen a round black spot, a planet, cross the upper one-fourth of the diameter of the face of the sun, on an upward-slanting path, for over an hour and a quarter. (The doctor would be awarded the French Legion of Honor and the new planet would be given the name Vulcan. There is, however, no such planet.)

SKY EVENT



December 22: Another fine winter day.

P. M.—To Flint's Pond.

C. is inclined to walk in the road, it being better walking there, and says: "You don't wish to see anything but the sky to-day and breathe this air. You could walk in the city to-day, just as well as in the country. You only wish to be out." This was because I inclined to walk in the woods or by the river.

As we passed under the elm beyond George Heywood's, I looked up and saw a fiery hangbird's nest dangling over the road. What a reminiscence of summer, a fiery hangbird's nest dangling from an elm over the road when perhaps the thermometer is down to -20 (?), and the traveller goes beating his arms beneath it! It is hard to recall the strain of that bird then.

We pause and gaze into the Mill Brook on the Turnpike bridge. C. says that in Persia they call the ripple-marks on sandy bottoms "chains" or "chain-work." I see a good deal of cress there, on the bottom, for a rod or two, the only green thing to be seen. No more slimy than it usually is beneath the water in summer. Is not this the plant which most, or most conspicuously, preserves its greenness in the winter? Is it not now most completely in its summer state of any plant? So far as the water and the mud and the cress go, it is a summer scene. It is green as ever, and waving in the stream as in summer.

How nicely is Nature adjusted! The least disturbance of her equilibrium is betrayed and corrects itself. As I looked down on the surface of the brook, I was surprised to see a leaf floating, as I thought, up the stream, but I was mistaken. The motion of a particle of dust on the surface of any brook far inland shows which way the earth declines toward the sea, which way lies the constantly descending route, and the only one.

I see in the chestnut woods near Flint's Pond where squirrels have collected the small chestnut burs left on the trees and opened them, generally at the base of the trunks on the snow. These are, I think, all small and imperfect burs, which do not so much as open in the fall and are rejected then, but, hanging on the tree, they have this use at least, as the squirrels' winter food.

Three men are fishing on Flint's Pond, where the ice is seven or eight inches thick. I look back to the wharf rock shore and see that rush (cladium I have called it), the warmest object in the landscape,—a narrow line of warm yellow rushes—for they reflect the western light,—along the edge of the somewhat snowy pond and next the snow-clad and wooded shore. This rush, which is comparatively inconspicuous in the summer, becomes thus in the winter afternoons a conspicuous and interesting object, lit up by the westering sun.



ASTRONOMY

ASTRONOMY

The fisherman stands erect and still on the ice, awaiting our approach, as usual forward to say that he has had no luck. He has been here since early morning, and for some reason or other the fishes won't bite. You won't catch him here again in a hurry. They all tell the same story. The amount of it is he has had "fisherman's luck," and if you walk that way you may find him at his old post to-morrow. It is hard, to be sure,—four little fishes to be divided between three men, and two and a half miles to walk; and you have only got a more ravenous appetite for the supper which you have not earned. However, the pond floor is not a bad place to spend a winter day. On what I will call Sassafras Island, in this pond, I notice the largest and handsomest high blueberry bush that I ever saw, about ten feet high. It divides at the ground into four stems, all very large and the largest three inches in diameter (one way) at three feet high, and at the ground, where they seem to form one trunk (at least grown together), nine inches in diameter. These stems rise upward, spreading a little in their usual somewhat zigzag manner, and are very handsomely clothed with large gray and yellow lichens with intervals of the (smoothish? and) finely divided bark. The bark is quite reddish near the ground. The top, which is spreading and somewhat flattish or corymbose, consists of a great many fine twigs, which give it a thick and dark appearance against the sky compared with the more open portion beneath. It was perfectly sound and vigorous. In a (apparently kingbird's?) nest on this island I saw three cherry-stones, as if it had carried home this fruit to its young. It was, outside, of gnaphalium and saddled on a low limb. Could it have been a cherry-bird? The cladium (?) retains its seeds over the ice, little conical, sharp-pointed, flat-based, dark-brown, shining seeds. I notice some seeds left on a large dock, but see none of parsnips or other umbelliferous plants. The furrows in the snow on the hillsides look somewhat like this:—

1860

Robert Wilhelm Bunsen and Gustav Kirchhoff were observing the emission spectra of alkali metals in flames. While observing the spectrum of a bright light source through the flame, they noted the presence of some dark absorption lines. The origin of these dark lines was similar to the origin of the dark lines in the solar spectrum that had been observed in 1802 by William Hyde Wollaston and in 1814 by Joseph von Fraunhofer, dark lines that had been attributed to the absorption of light by gases, in the solar atmosphere, cooler than those deeper down that had originated the light.

HISTORY OF OPTICS

ASTRONOMY

ASTRONOMY

January 7, night of the full moon in January/April 6, night after the night of the full moon: [Harvard Observatory](#) produced a stereoscopic¹⁸⁵ collodion¹⁸⁶ photograph of the surface of the moon. For the first time one could get some direct sense of curvature and of depth, and mountains and valleys. The trick is, stare at this and let your eyes cross until the four images merge to produce a row of three images, and then transfer your attention to the middle image and inspect it as if you were inspecting someone's face.¹⁸⁷

ASTRONOMY

In San Francisco, California, ["Grizzly" Adams](#) took passage aboard the *Golden Fleece*, with his menagerie, to sail around Cape Horn and back to New-York, where he would provide one of the exhibits in Phineas Taylor Barnum's American Museum. By this point Adams could offer not only bears, cougars and other large land animals, but also a sea-lion. Barnum would be an equal partner in the ownership of the collection. Adams's wounds were being dressed every day by a Dr. Johns, and his wife came down from Massachusetts to nurse him.



185. Sir Charles Wheatstone had experimented with simple stereoscopic drawings in 1832 and obtained a patent for a stereoscope device in 1838. Since the more popular Victorian device designed by Oliver Wendell Holmes, the Holmes Stereo Viewer, would not be patented until 1861, we may infer that this stereoscopic collodion of the moon was being prepared for the Wheatstone viewer rather than for the Holmes viewer. In all probability it was being created in order to provide the public with visual proof that the moon is indeed a sphere rather than a flat disk.

186. Collodion, meaning "gluelike," is a highly flammable, colorless or yellowish syrupy solution of pyroxylin, ether, and alcohol which has been found useful as an adhesive to close small wounds and hold surgical dressings, and for the creation of photographic plates.

187. OK, it takes practice, but once you know how it will be as easy as reciting the first 27 digits of π .



ASTRONOMY

ASTRONOMY

February 27, Monday: From this point until March 14th a double [comet I Liais or Olinda](#), would be traversing the skies. It had a 20° tail. This double comet, together with 1861's [comet I Thatcher](#), would become contributors to our [Andromedid meteor showers](#).

SKY EVENT



Feb. 27. 2 P. M.—Thermometer 50.

To Abner Buttrick's Hill.

The river has been breaking up for several days, and I now see great cakes lodged against each of the bridges, especially at Hunt's and the North Bridge, where the river flows with the wind. For a week or more you could not go to Ball's Hill by the south side of the river. The channel is now open, at least from our neighborhood all the way to Ball's Hill, [Yes, and upward as far as Cardinal Shore, the reach above Hubbard's Bridge being open; thence it is mackerelled up to the pond.] except the masses of ice moving in it; but the ice generally rests on the bottom of the meadows,—such as was there before the water rose,—and the freshet is for the most part covered with a thin ice except where the wind has broke[N] it up. The high wind for several days has prevented this water from freezing hard.

There are many cranberries washed far on to a large cake of ice which stretches across the river at Hunt's Bridge. The wind subsiding leaves them conspicuous on the middle of the cake.

I noticed yesterday that the skunk-cabbage had not started yet at Well Meadow, and had been considerably frost-bitten.

Heywood says that when the ground is regularly descending from the north to the railroad, a low fence a quarter of a mile off has been found to answer perfectly; if it slopes upward, it must be very near the road.

I walk down the river below Flint's on the north side. The sudden apparition of this dark-blue water on the surface of the earth is exciting. I must now walk where I can see the most water, as to the most living part of nature. This is the blood of the earth, and we see its blue arteries pulsing with new life now. I see, from far over the meadows, white cakes of ice gliding swiftly down the stream,—a novel sight. They are whiter than ever in this spring sun.

The abundance of light, as reflected from clouds and the snow, etc., etc., is more springlike than anything of late. For several days the earth generally has been bare. I see the tawny and brown earth, the fescue- and lichen-clad hills behind Dakin's and A. Buttrick's.

Among the radical leaves most common, and therefore early-noticed, are the veronica and the thistle,—green in the midst of brown and decayed; and at the bottom of little hollows in pastures, now perhaps nearly covered with ice and water, you see some greener leafets of clover.

I find myself cut off by that arm of our meadow sea which makes up toward A. Buttrick's. The walker now by the river valley is often compelled to go far round by the water, driven far toward the farmers' door-yards.

I had noticed for some time, far in the middle of the Great Meadows, something dazzlingly white, which I took, of course, to be a small cake of ice on its end, but now that I have climbed the pitch pine hill and can overlook the whole meadow, I see it to be the white breast of a male sheldrake accompanied perhaps by his mate (a darker one). They have settled warily in the very midst of the meadow, where the wind has blown a space of clear water for an acre or two. The aspect of the meadow is sky-blue and dark-blue, the former a thin ice, the latter the spaces of open water which the wind has made, but it is chiefly ice still. Thus, as soon as the river breaks up or begins to break up fairly, and the strong wind widening the cracks makes at length open spaces in the ice of the meadow, this hardy bird appears, and is seen sailing in the first widened crack in the ice, where it can come at the water. Instead of a piece of ice I find it to be the breast of the sheldrake, which so reflects the light as to look larger than it is, steadily sailing this way and that with its companion, who is diving from time to time. They have chosen the opening farthest removed from all shores. As I look I see the ice drifting in upon them and contracting their water, till finally they have but a few square rods left, while there are forty or fifty acres near by. This is the first bird of the spring that I have seen or heard of.

C. saw a skater-insect on E. Hubbard's Close brook in woods to-day.

June: During a violent storm, a large number of small black stones fell on the town of Wolverhampton, England.

ASTRONOMY

June 18, Monday: The Democratic Party adopted a platform.

READ THE FULL TEXT

A new [comet](#) of the 1st magnitude was discovered in the evening twilight on the northwestern horizon, situated in Auriga (C/1860 M1=1860 III). It had flipped around the sun on June 16th and it would be possible to follow its recession with the unaided eye until about the end of July. It would develop a tail up to 20 degrees long. At the opening of July, located in Lynx and of 1st or 2nd magnitude, it would display a 15 degree tail. Between July 6 and 12, it would be crossing western Leo, passing near Regulus on the night of the 10th with a brightness of about 3rd magnitude, its tail rapidly decreasing in length. After mid-month the comet would move across Crater and Corvus. It would become a Southern Hemisphere object and there it would independently be discovered with the naked eye, before as it receded it dropped below that threshold of brightness.

SKY EVENT



June 18: The tumultuous singing of birds, a burst of melody, wakes me up (the window being open) these mornings at dawn. What a *matinée* to have poured into your slumber!

**Thoreau as
Ornithologist**

July 18: Wet-plate photographs were made of a total solar [eclipse](#) (#7313), as it passed from Washington state up across Hudson Bay, and this type of photograph required only 1/30th of the exposure time which would have been required for a Daguerreotype.

SKY EVENT

SUN



July 18, Wednesday: 2 P.M.—To Second Division.

The *Asclepias Cornuti* is abundantly visited nowadays by a large orange-brown butterfly with dark spots and with silver spots beneath. Wherever the *asclepias* grows you see them.

The Second Division *juncus* is already withering and is considerably browned, so early is it. It appears not to ripen any seed.



November 5. P.M.—To Blood's oak lot.

Measure the great white oak near the bars of the bridle-road just beyond the northeast corner of the Holden (?) farm. At the ground it is about nineteen feet in circumference. At three feet from the ground it is eleven feet and seven inches in circumference, and the same at five feet and apparently more above this. It is about sixteen feet to the lowest limb. The whole trunk standing aslant. It has a black and quite rough bark, not at all like that of the white oaks of Wetherbee's and Blood's lots. There is a large open space amid the huckleberry bushes beneath it, covered with a short and peculiarly green sward, and this I see is the case with other oaks a quarter of a mile off.

There is a large chestnut in the lot east of this, and I observe that its top is composed of many small branches and twigs disposed very regularly and densely, brush-wise, with a firm, distinct, more than semicircular edge against the horizon, very unlike the irregular, open, and more scraggy-twigged oak.

Blood's oak lot may contain about a dozen acres. It consists of red, black, white, and swamp white oaks, and a very little maple. The following are some of the largest that I saw. I measured one black oak which was, at three feet high, four feet eight inches in circumference; another, five feet six inches; and another the same. A red oak was six feet three inches; another, seven feet four inches; another, seven feet four inches; another, seven feet. One swamp white oak was six feet four inches. A white oak was seven feet seven inches, and another the same. The diameter of a third at one foot from ground (sawed off) was thirty-one and a half inches average.

This is quite a dense wood-lot, even without considering the size of the trees, and I was rather surprised to see how much spread there was to the tops of the trees in it, especially to the white oaks. The trees here rise far higher before branching, however, than in open land; some black oaks (if not others) were very straight and thirty to forty feet high without a limb. I think that there was not so much difference in color between the trunks of black and red oaks as commonly. The red oaks were oftener smooth, or smoothish, the largest of them. I saw very little decay. Considering their number and closeness, the trees were on the whole larger than I should have



expected, though of course not nearly so large as the largest pasture oaks,—one to two and a half feet in diameter, or say generally (the sizable trees) a foot and a half in diameter. This will probably do for a specimen of a primitive oak forest hereabouts. Such probably was the size and aspect of the trees.

As for its age, I saw the stump of a white oak (not quite so large as those I measured) which had been sawed off at about one foot from the ground within four or five years, perfectly level and sound to the core, and thirty-one and a half inches in diameter. The first thirty-three (?) rings were so close and indistinct as to be impossible to count exactly (occupying three quarters of an inch of the centre); the rest was perfectly distinct. In all one hundred and forty-seven rings; or, by inches from middle, thirty-nine, nine, six, seven, five, eleven, six, four, four, five, six, nine, ten, twelve, and then three quarters of an inch left. From which it appears that it grew much the fastest at about the age of eighty-nine years and very much the slowest for the first thirty-three years.

I am struck by the fact that the more slowly trees grow at first, the sounder they are at the core, and I think that the same is true of human beings. We do not wish to see children precocious, making great strides in their early years like sprouts, producing a soft and perishable timber, but better if they expand slowly at first, as if contending with difficulties, and so are solidified and perfected. Such trees continue to expand with nearly equal rapidity to an extreme old age.

Another white oak stump, not so large but somewhat decayed, had one hundred and sixty and more rings. So that you may say this wood is a hundred to a hundred and sixty years old.

I was struck by the orderly arrangement of the trees, as if each knew its own place; and it was just so at Wetherbee's lot. This being an oak wood, and like that, somewhat meadow [SIC] in the midst, the swamp white oaks with a very few maples occupied that part, and I think it likely that a similar selection of the ground might have been detected often in the case of the other oaks, as the white compared with the red. As if in the natural state of things, when sufficient time is given, trees will be found occupying the places most suitable to each, but when they are interfered with, some are prompted to grow where they do not belong and a certain degree of confusion is produced. That is, our forest generally is in a transition state to a settled and normal condition.

Many young white pines—the largest twenty years old—are distributed through this wood, and I have no doubt that if let alone this would in a hundred years look more like a pine wood than an oak one.

Hence we see that the white pine may introduce itself into a primitive oak wood of average density.

The only sounds which I heard were the notes of the jays, evidently attracted by the acorns, and the only animal seen was a red squirrel, while there were the nests of several gray squirrels in the trees.

Last evening, the weather being cooler, there was an arch of northern lights in the north, with some redness. Thus our winter is heralded.

It is evident that the pasture oaks are commonly the survivors or relics of old oak woods,—not having been set out of course, nor springing up often in the bare pasture, except sometimes along fences. I see that on the outskirts of Wetherbee's and Blood's lots are some larger, more spreading and straggling trees, which are not to be distinguished from those. Such trees are often found as stragglers beyond a fence in an adjacent lot. Or, as an old oak wood is very gradually thinned out, it becomes open, grassy, and park-like, and very many owners are inclined to respect a few larger trees on account of old associations, until at length they begin to value them for shade for their cattle. These are oftenest white oaks. I think that they grow the largest and are the hardiest. This final arrangement is in obedience to the demand of the cow. She says, looking at the oak woods: "Your tender twigs are good, but grass is better. Give me a few at intervals for shade and shelter in storms, and let the grass grow far and wide between them."

No doubt most of those white pines in pastures which branch close to the ground, their branches curving out and upward harpwise without one erect leading shoot, were broken down when young by cows. The cow does not value the pine, but rubs it out by scratching her head on it.

AURORA

1861

Daniel Kirkwood theorized that periodic [meteor](#) swarms were produced by fragments left behind by disintegrating [comets](#), distributed along their antique orbits. (However, it would not be until 1867 that this recognition of the nature of this phenomenon would be generally appreciated.)

LEONID METEOR SHOWER

[Concord](#) experienced an invasion of the army worm (possibly *Heliophila unipuncta*).

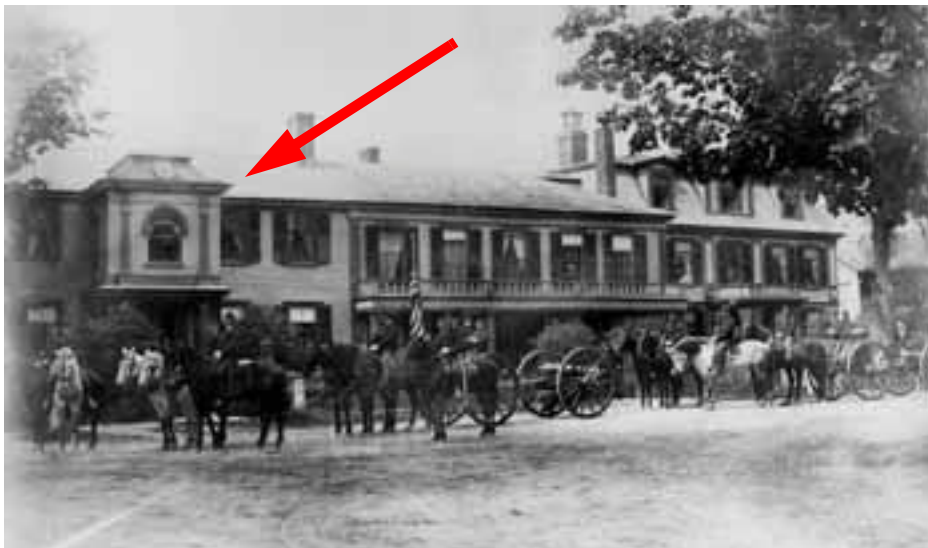
What are the natural features which make a township handsome? A river, with its waterfalls and meadows, a lake, a hill, a cliff or individual rocks, a forest, and ancient trees standing singly. Such things are beautiful; they have a high use which dollars and cents never represent. If the inhabitants of a town were wise, they would seek to preserve these things, though at considerable expense; for such things educate far more than any hired teachers or preachers, or any at present recognized system of school education. I do not think him fit to be the founder of a state or even of a town who does not foresee the use of these things, but legislates chiefly for oxen, as it were.

If we have the largest boulder in the county, then it should not belong to an individual, nor be made into door-steps.

We cut down the few old oaks which witness the transfer of the township from the Indians to the white man, and commence our museums with a cartridge-box taken from a British soldier in 1775.

– "Henry David Thoreau, *The Journal* (1861)," as quoted on page 140 of William Least Heat-Moon's *PrairieErth (a deep map)* [Boston MA: Houghton Mifflin, 1991].

[Daniel Shattuck](#) was still living in the house that is now the west wing of the Colonial Inn, but with his daughter [Frances Shattuck Surette](#) who was married to [Louis A. Surette, Jr.](#); he would deed this property to her along with the house which would become the inn's east wing. (Thomas Surette, his grandson, would become known as a musician.)



Daniel Kirkwood has theorized, and now there seems to be little disagreement, that the periodic meteor





ASTRONOMY

ASTRONOMY

swarms which the earth encounters are being produced by fragments left behind by disintegrating [comets](#), distributed along their antique orbits. (However, his early recognition of the nature of this phenomenon would not be generally shared until the year 1867.)

ASTRONOMY

Although we will focus in this Kouroo database on the great June [comet II Tebbutt](#) of this year, be it noted that during this year 1861 there were actually two comets. The other comet, which is named Thatcher, is a periodic one with a period of about 415 years. This lesser Thatcher comet of this year is possibly the parent of the Lyrid meteor shower that comes into our skies each April, a shower that was first noticed in April of 687 BCE  and would again become very prominent in April of 1982 .

As civil war broke out and Brooklyn's attention was drawn to the conflict, the [Brooklyn Eagle](#) of course began making money hand over fist. There was a Grand Jury inquiry to determine whether several presses including it were guilty of disloyalty, and of encouraging the enemy by urging the North to give in to the demands of the Southrons. The [Eagle](#) of course argued indignantly on behalf of its freedoms of speech and of the press. Although it would not be indicted, the US postmaster general would order the New-York postmaster not to accept any more of its newspapers for mailing (from this year until 1884 Thomas Kinsella would be the tenured editor at this newspaper).

[Matthew Fontaine Maury](#), a native of Virginia, handed in his federal commission in order to serve his native state as Chief of Sea Coast, River and Harbor Defences. When [Maury](#) resigned, [Lt. James Melville Gilliss](#) came to be in charge at the [US Naval Observatory](#) (he had previously been responsible merely for obtaining the observatory's instruments and books).

[Benjamin Apthorp Gould](#) got married with Mary Apthorp Quincy, daughter of the Reverend Josiah Quincy. He undertook the task of preparing for publication the records of astronomical observations made at the [US Naval Observatory](#) since 1850.

ASTRONOMY

[Maury](#) would be sent by the Confederacy to England, Ireland, and France to purchase ships while conducting a propaganda campaign for the South and for peace. He would try desperately through speeches and newspaper articles to get foreign nations to intercede in our fratricidal conflict. Having had experience with the transatlantic cable and electricity flowing through wires underwater while working with Cyrus West Field and Samuel Finley Breese Morse, he put that experience to use by developing an electric "torpedo" (similar to a present-day contact mine) — the Secretary of the Navy would in 1865 acknowledge that his device had "cost the Union more vessels than all other causes combined."

After the surrender, [Maury](#) would serve Maximilian in Mexico as "Imperial Commissioner of Immigration" and build the Carlotta and New Virginia Colony for displaced Confederates and immigrants from other lands. He would then accept a teaching position at the Virginia Military Institute in Lexington, Kentucky, holding the chair of physics, and write on THE PHYSICAL GEOGRAPHY OF VIRGINIA.

May 13, Monday: In Australia, without the assistance of a telescope, Jerome L. Tebbutt sighted a new [comet](#):



One of the great comets. No great comet between the one in 1556 and Hyakutake in 1996 came as close as this one. But there were additional wonders unique to this comet. Certainly no comet in at least the past 500 years filled the sky with so broad a fan of observable tail, and perhaps there is none whose tail Earth is so likely to

have passed through. And, as far as I can determine, this comet presented the angularly longest completely visible tail on record (at least in recent centuries).

SKY EVENT

[Henry Thoreau](#) and Mann got as far as the Delevan House (“not so good as costly”) in Albany, New York overlooking the railroad and the Hudson River. In a letter to his mother, Mann indicated that it had been raining and Mr. Thoreau was “pretty tired.”



May 13. Worcester to Albany.

The latter part of the day rainy. The hills come near the railroad between Westfield and Chester Village. Thereafter in Massachusetts they may be as high or higher, but are somewhat further off. The leafing is decidedly more advanced in western Massachusetts than in eastern. Apple trees are greenish. Red elder-berry is apparently just beginning to bloom. Put up at the Delavan House. Not so good as costly.

June 11, Tuesday: The great [comet](#) of this year, although at this point its tail was 40 degrees in length, was lost in the glare of the sun.

SKY EVENT

June 12, Wednesday: The great [comet](#) of this year completed its voyage toward the sun and began its trip outward. It had still not become visible from the northern hemisphere, nor had the news of its existence yet arrived by steamer from its southern-hemisphere observers — the astronomers of the earth’s major observatories, all of them in the northern hemisphere, would be suddenly stunned by its appearance as it came up in full display over our southern horizons.

SKY EVENT

John Tebbutt (Windsor, New South Wales) discovered this comet on 1861 May 13.37

The comet was widely observed in the Southern Hemisphere during June. Although it passed perihelion on June 12, the comet actually continued to brighten and develop a spectacular tail as it continued to approach Earth. Emmanuel Liais (Rio de Janeiro) saw the comet on the 12th and said the nucleus equalled a star of magnitude 2 or 3, while the tail was 40° long. On the 20th Edward John White (Williamstown, Victoria, Australia) said the nucleus equalled a star of magnitude 2 and was distinctly fan-shaped in a telescope. He added that the tail was double, with the western or main tail extending over 40° and the eastern tail extending about 5° and separated by an angle of 34°. The eastern tail was also slightly curved toward the east. The comet’s path kept it south of the sun until after June 28, thus making the 29th the absolute earliest Northern Hemisphere observers could have seen it.

Closest Distance to Earth (0.1326 AU): The comet was well-observed as it passed closest to Earth on June 30. The total brightness was estimated as “not as bright as Jupiter” (fainter than magnitude -2) by Johann Friedrich Julius Schmidt (Athens), while the nuclear magnitude was estimated as 1 by T. Brorsen (Senftenberg), but “intermediate” between Venus and Jupiter according to the Reverend Thomas William Webb (Hardwick Parsonage). He added that the comet had a golden hue to it. Hermann Goldschmidt (Paris, France) estimated the diameter of the nucleus as near 4”, while G. Schweizer (Moscow, Russia) more precisely measured it as 3.07”. Webb observed with a 5.5-inch refractor and estimated it as 2”, but admitted that he probably underrated it. He added that it was “a fine luminous disc” with “a very ill-terminated, but still definite, limb.” Webb also observed the comet at 27x and said the comet looked “as though a number of light, hazy clouds were floating around a miniature full moon.” He was describing six “luminous veils” located within the coma, the brightest



of which was nearest the nucleus, while the faintest was farthest away. Johann Gottfried Galle (Wrocław (formerly Breslau), Poland) said the nucleus was “extremely bright and distinct,” while the Reverend R. Main (Radcliffe Observatory, Oxford) said a telescope showed it was elliptical, with the major axis “directed nearly towards the Sun.” Main added, “A stream of light went off from the upper apparent part of the nucleus, and turned round towards the apparent west in the shape of a sickle. Another but fainter stream was seen on the apparent east side of the first stream, also turning round towards the west.” The coma was described as a parabolic curve by Galle, with Schmidt estimating its diameter as 60-70'. The tail was very impressive and contained a number of rays. Although Galle estimated the length as 30° to 40° and Goldschmidt said it was 35° long and 3° to 4° wide, other observers noted a much longer length. Schmidt said the tail was 120° long, Brorsen estimated it as 90° in length, Webb said it was at least 90° long, and Main indicated it was “considerably longer” than 43°. George Williams (Liverpool) observed a tail ray extending through Boötis into Ursa Major, as well as a somewhat brighter ray extending into Cassiopeia. He suspected they might have been clouds, but noted that both pointed towards the comet's nucleus. Webb and his wife noticed a faint ray “of perfectly similar character to the tail, stretching under the square of Ursa Major, about 3° or 3.5° broad...and traceable about half way from the latter star to Arturus: it pointed to the Comet, but in the twilight no connexion could be made out.” Webb added that about 20-minutes later it had become brighter. He concluded it was probably a “cirrus cloud, brought up by the N. W. wind.”

July Observations: Although the comet continued to be well-observed during the first days of July, fewer physical descriptions were being made by July 5th, but these still indicated the tail was of great length. The main tail was estimated as 63 degrees long by Littrow, 85 degrees long by Schmidt, and 45 degrees long by Quirling, with the latter astronomer also indicating the greatest width was 10 degrees. The second tail was estimated as wide and 30 degrees long by Littrow. Schmidt estimated the coma diameter as 50 arcmin. Webb swept rapidly across the tail with his comet eyepiece and noted a slightly darker region extended from the nucleus for a short distance into the tail. Activity was still visible within the coma. Main said the nucleus was “very bright and almost equal to a star of the first magnitude.” He added that the two streams of light “now pass symmetrically on each side of the nucleus.” Peters said the diameter of the nucleus was 5.7 arcsec or possibly smaller and that the 13.5-inch refractor showed one bright inner envelope and two faint outer ones. In addition, he noted “many fine jets streaming out from the nucleus, part of them recurving to the right, others to the left.” This comet was independently discovered by David Livingston on July 6, who was then traveling down the Shire River near present day Blantyre, Malawi, in Africa. He noted “a large comet in Ursa Major” and estimated the tail length as 23 degrees. Littrow estimated the main tail as 59 degrees long and about 2.5 degrees wide, while the second tail was about 30 degrees long and distinctly fainter since the 5th. Webb said the tail seemed slightly turned to the left again. Peters said, “The secondary tail is quite bright, and as wide as the principal tail, branching off from it to the west under an acute angle.” He added that the 13.5-inch refractor revealed a nucleus 3.8 arcsec across. The last big day of observations for this comet came on July 7. John Kirk, who was traveling independent of Livingston down the Shire River, in Africa wrote, “This night we got sight of a splendid comet in the Great Bear moving rapidly from the sun.” Heis said the brightness equalled Gamma Ursae Majoris (magnitude 2.44). Dembowski estimated the tail length as 30 degrees, while Gilliss said it was no more than 25 degrees long and 3 degrees wide. Peters agreed that the tail seemed to have decreased in brightness at its end, but was wider and still visible over 30 degrees. Dembowski said the fan extending from the nucleus was less definite than on the 3rd. Gilliss commented that the luminous sector was “much smaller and fainter, and for the greater part of the time could scarcely be discerned at all as distinct from the general mass of light.” Peters said the 13.5-inch refractor indicated the outer envelopes were no longer visible, while the inner envelope seemed to be undulating before his eyes. Descriptive observations were sparse during the second half of July. On the 16th Heis said the brightness nearly equalled that of Iota Draconis (magnitude 3.29), while Quirling estimated the tail length as 12 to 13 degrees. On the 17th Heis said the brightness was between those of Iota Draconis (magnitude 3.29) and Alpha Draconis (magnitude 3.65). While the comet faded the nucleus was beginning to change as well. E. Schönfeld (Mannheim) said the nucleus appeared a little diffuse on the 18th, while Peters noted on the 24th, “The nucleus now appears much less stellar than before, rather as a blurred surface, of 8” in diameter, though this measure is little reliable.” He added that the outline of the envelope was no longer visible, though the moon was nearly full.



Observations for Remainder of 1861: On August 10, Heis said the comet was three steps fainter than Iota Boötis (magnitude 4.76). On August 12, Peters observed with a 13.5-inch refractor and wrote, "The nucleus has become small and is rather dim...." On August 13, Schönfeld said the coma was 5 arcmin across, and contained a nucleus which was not centrally placed. On August 14, Schönfeld said the coma was 4 arcmin across. On August 15, Heis said the comet was still a naked eye object. On September 2, Schönfeld said the coma was 5 arcmin across. On September 3, Schönfeld said the nuclear magnitude was 9. On September 12, Schönfeld said the coma was about 2.5 arcmin across in moonlight. On September 16, Peters said skies were cloudy and affected by moonlight, but he did manage to catch sight of the comet with the 13.5-inch refractor. He noted that the comet's faintness only allowed a faint illumination of the wires used for measuring its position. On October 1, C. Bruhns (Leipzig) said the comet appeared rather faint in the 6-foot focal length refractor. On October 4, Schönfeld said the nucleus was still visible. Bruhns said the comet appeared rather faint. On October 5, Schönfeld said the nucleus was magnitude 11. On October 11, Peters observed with a 13.5-inch refractor and described the comet as "dull". On October 13, Schönfeld said the coma was round and 2 arcmin across, with a nucleus of magnitude 11. On October 19, Peters observed with the 13.5-inch refractor and noted the nucleus "is more concentrated to a point." On October 25, Schönfeld said the coma was 3 arcmin across, with an eccentrically situated faint nucleus. On November 4, Schönfeld said the coma was fairly faint, with an indistinct nucleus of about magnitude 11-12. On November 5, Schönfeld said the coma was 1.3 arcmin across. On November 21, Schönfeld said the coma was 1.5 arcmin across. On November 25, Schönfeld said the comet contained a condensation of magnitude 12-13. On November 28, Schönfeld said the diffuse coma was rather faint and 0.7 arcmin across. There was also a weak condensation. Schönfeld observed on December 22 and 23 and said the comet was fairly bright, with a coma 20 arcsec across, and well condensed. On December 26, Peters observed the comet with a 13.5-inch refractor.

On January 3, 1862, Peters observed the comet with a 13.5-inch refractor. On January 5, Peters observed with a 13.5-inch refractor in moonlight, strong winds, and a temperature of $-4\frac{1}{2}$ F, and noted the comet was difficult to see. Schmidt observed the comet with difficulty using peripheral vision on both February 3 and 6. O. Struve (Pulkova) saw the comet on April 16 and said the coma was 40" across. He noted, "Its light is, even in its present faint state, not quite uniform, but shows distinctly traces of concentration." The comet was last detected on May 1.

Orbit: Hopff used three positions obtained between June 30 and July 2, and computed a parabolic orbit which was first published on July 12. The perihelion date was determined as June 11.98. Pape used three positions obtained between June 30 and July 6, and computed a parabolic orbit which was first published on July 12. The perihelion date was determined as June 12.23. Hubbard used three positions obtained between July 3 and 18, and computed a hyperbolic orbit. The perihelion date was determined as June 12.57, and the eccentricity was 1.0265470. A. Murmann used three positions obtained between June 30 and July 4, and computed a parabolic orbit which was first published on August 2. The perihelion date was determined as June 12.15. H. Seeling (Altona) used three positions obtained between June 12 and July 21, and computed a parabolic orbit which was first published on August 2. The perihelion date was determined as June 12.21. Sluzki took positions determined by Schweizer during the period of June 30 to September 10, and computed an elliptical orbit with a perihelion date of June 12.00, and an orbital period of 399.81 years. During 1880, Heinrich Carl Friedrich Kreutz used 1156 positions obtained between 1861 May 27 and 1862 May 1 and computed an elliptical orbit with a perihelion date of June 12.01 and an orbital period of 409 years. Perturbations for four planets were included.



June 30, Sunday evening: An unanticipated [comet](#) of enormous size suddenly appeared on the horizon, over the United States and Europe. Calculations indicate that on this night the earth probably was passing directly through the gas and dust of this comet's tail. On this night, actually, the celestial observer E.J. Lowe jotted into his meteor log that the sky had been of a yellowish tinge before sunset, with the sun seeming somehow dimmed and the general levels of illumination less than usual. Also, John Russell Hind reported a certain peculiar phosphorescence in the appearance of the sky, something which may or may not have been entirely attributable to the aurora of the Northern Lights. From the observatory of Athens we have this report from the astronomer Schmidt:

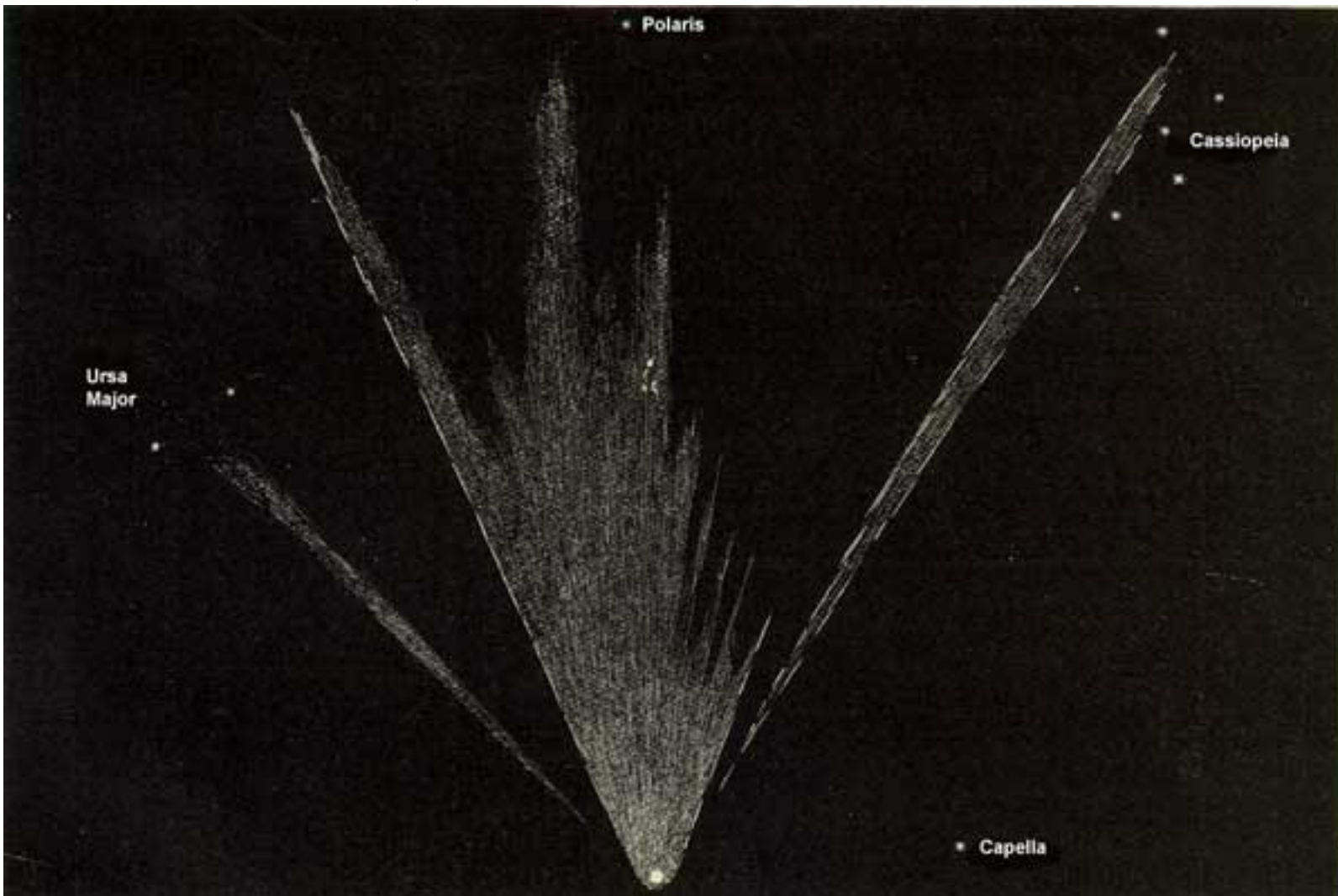
SKY EVENT


The twilight behind Mt. Parnassus had not yet faded away when I was informed, and I can truthfully say no other surprise could have made so deep an impression. The night before had been absolutely clear and I had not seen a trace of a comet. Now the sky was filled by this majestic figure, spreading the tail from horizon to beyond Polaris, and even across Lyra. It was, to use the language of the past, a comet of truly fearful appearance. At 9 o'clock the head of the comet, looking as large as the moon, was next to Mt. Parnassus. The head and the very wide lower part of the tail appeared like a distant fire, and the tail seemed like windblown smoke illuminated by the fire. After the head had disappeared below the horizon and it had grown dark, one could see that the tail extended to the Milky Way in the constellation Aquila. At 11PM I went to the observatory to watch [for] the reappearance of the head in the northeast.... At midnight and for some time after the tail stood nearly vertically above the northern horizon, its most brilliant portion and the nucleus hidden, the tail reached 30 degrees of arc beyond the zenith [indicating that the total length of this comet's tail above and below the zenith would measure more than 120 degrees]. At 4:27AM the head of the comet became visible again, following reappearance of the brightest parts of the tail which produced weak but noticeable shadows. Neither the Great Comet of March 1843 nor Donati's comet of October 1858 had been so bright.... I watched the rising of the comet's head with the naked eye; it was an incredible phenomenon that cannot be compared to anything else. The great mass of light hung like a dull smoky fire over the dark outline of the mountains. As it grew lighter the tail disappeared, I could only see about 4 degrees of arc of the tail at 5:30AM. But at 6:08AM when Capella was the only still visible star the nucleus was still clearly luminous.

ASTRONOMY

ASTRONOMY

The 4th great new [comet](#) of the 19th Century, I Thatcher, had been first detected from Australia. Of course, since the only way to notify Europe of the detection of this comet was by ship and so, by the time this news arrived in the Northern hemisphere, it had already come been sighted also by Europeans and Americans. This comet appeared inordinately large because it was passing close by our planet and as of this date was brushing across us its complicated tail of changing construction.¹⁸⁸ This comet, together with the double comet I Liai of 1860, would contribute to our [Andromedid meteor showers](#).¹⁸⁹



188. Venus, at its closest point to the Earth, is about 23,000,000 miles away, and this comet was passing within 11,000,000 miles. By way of strong comparison, the comet Lexell had in July 1770  passed within 1,401,200 miles. Of course, nothing happened of any great moment in either case, as the tail of a comet is quite insubstantial even by way of contrast with a meteor shower, but this would give rise to stories (sponsored it would appear by adherents of the "God's This Weird Dude" school of theology) connecting the event to the bloodshed of our Civil War.

189. "COMET TEBBUTT, (C/1861 N1=1861 II). A naked-eye object from discovery until mid-Aug., T=1861 June 12. Extraordinary display created by comet's close encounter with Earth. Spotted in the Southern Hemisphere on May 13th at 4th magnitude. Moved north very slowly across Eridanus. On June 8th, of 2nd magnitude. At mid month, 1st magnitude. Tail already 40 degrees long. Thereafter, motion increased dramatically. On June 24th, when near Rigel, zero magnitude. In conjunction with the Sun on June 29th. Earth passed through the comet's tail! In the Northern Hemisphere, appeared suddenly in Auriga at dawn - immense, brilliant object. Descriptions suggest the head was at least -1 or -2 magnitude. Tail seen to stretch from Auriga to Ophiuchus - 120 degrees! Comet became circumpolar on July 1st. The next night the head was zero magnitude, tail 97 degrees long. On July 8th, when near the Big Dipper, 1st magnitude with a tail up to 60 degrees long. Thereafter rapidly declined. Of 2nd to 3rd magnitude at mid month, 4th at the end. Lost to the unaided eye in mid August."



As of this date or slightly later, from New Bedford, [Henry Thoreau](#)'s "Friend Ricketson," [Friend Daniel Ricketson](#), was writing to inform him that he had been "converted" to a strong belief in the truth of Christianity.

The Shanty, 30th June 1861

Friend Thoreau,

I have been desirous of hearing from you for a long time, and particularly in regard to your health, which from your letter of 22^d March I was sorry to hear was not as good as usual; but as you speak of your complaint as that of "a severe cold," I hope by this time you have bid farewell to it and are once more tramping about the woods and fields of old Concord and boating on your favorite stream. We had our full share of the snowstorm of which you gave so glowing an account inclusive of your domestic water sentinel (a short way of saying pump!) with its "ghost" of snow. I have kept my usual record of the return of the birds, and am happy to inform you that the Quail has several times of late saluted me with his sweet whistle or call for "Bob White" as the country boys hereabouts translate him. We have had a peculiar singing pewee with an additional stave to his little song very peculiar & rather comical in its way.

I am glad to hear of the success of Friend Alcott, as Superintendent of your village schools— Concord may well be proud to have such a Captain— Please remember me affectionately to him & his family & thank him for me for a copy of his School Report which I duly rec^d and read with attention, noting Miss A's happy travesty of the old Scotch border song. I was sorry to find you "aberrant" and hope that some less cause than illness prevented you. Concord cant spare any of her ballast.

My dear friend, Since I saw you, & considerably since I wrote you last have I met with some fresh and very unexpected experiences, which have resulted in a change of my religious views. Long, long have I striven to become a good man, rather, to obtain that peace of mind which I conclude to be the evidence of a soul in a state of acceptance with its Creator, but in vain have been my efforts and my researches in the wisdom of the schools of ancient and modern philosophy, the (I fear) delusive and bewitching scepticism of so many noble minds. I am now quite inclined to believe in what are termed the dogmas of Christianity – at least in a part of them & have ceased to rebel against the rest. From my repeated failures in the path of virtue & godliness I am at last convinced of the necessity of regeneration i.e. a new heart – and what may surprise you still more, I am led to believe in the existence of an Evil Spirit, the great adversary of the Soul, whose malign influence has so often destroyed my fondest hopes of peace. I seize upon the truth of the Gospel as recorded in the Old and New Testaments as a shipwrecked sailor to the hand stretched forth to rescue him from the whelming waves. The spiritual wants of man herein recorded and corroborated by his inward light



seem to be so aptly fitted that nothing less than a Divine master could have given them to us. What is human life without the faith and hope thus inspired within the soul! – the faith of so many of the great and good, the saints and Martyrs of the Church of Christ. Oh! dear T. we need it all. “I am not mad most noble Festus” but am willing to be accounted a fool for the sake of the great Head of the Church. I know that you are too good and too pure a man to smile at my new born Zeal or rather newly awakened for I once before long ago was similarly led. Do nt think that I am about to forsake my kind Concord friends, the purest, wisest and best of philosophers, dear noble souls – no – My heart yearns for your spiritual recognition of the revealed word, wherein ye may see that “ye must be born again”. What ever takes from our faith and hopes in the future life, robs us of the only possessions that render our earthly existence endurable.

Let us devoutly pray to God for light, for light & strength. We must feel contrite – be ready to smite our breast and cry “God be merciful to me a sinner”. O! there must be a listening ear to the fervent petition of the troubled soul– Our Heavenly Father will hear us — He will answer too our prayers. I humbly trust that He has mine.

As I said before I have no rebellion in my heart now– I gladly accept whatever provision God has made for our future happiness, & endeavor to repose with faith upon the arm of Divine Wisdom– Welcome Christ the Saviour of our souls if God so wills, Mystery though it be – purest of the pure, simplest & wisest of all teachers, who died for his faithfulness – the great exemplar & guide of man through the thorny road of earthly life, whose life blood sealed the great testimony of truth he wrought out for us – typical of regeneration He died for us all– How grateful we should feel towards him, the great Head of the Church.

Monday Mrng. July 1. Thus far I wrote last evening & now take my pen to draw my letter to a close. We are just commencing mowing & the scythes are already busy in the hands of my hired men – the most graceful of the farmer’s graceful labor – all of which is the living poetry of rural life.

Do let me hear from you soon? And remember me kindly to Channing for whom I shall ever feel an affectionate interest, and to dear father Alcott, and to that complex gentleman, scholar, philosopher & Christian, Radulphus Primus! My wife has had a long illness, but is now recovering. My valued Uncle, James Thornton died 27 April last in his 64th year, of which please inform Channing, who knew him. With kind regards to your mother & sister, I remain truly & affectionately

Your friend,

Dan^l Ricketson

“Te teneam monius deficiente manu.”

What he meant by that he would feel sufficiently confident to confide to his journal in his extreme old age, in May 1885 just after he had read of and had evidently been perplexed by the supernaturalist beliefs that had passed for religion in the mind of Victor Hugo:

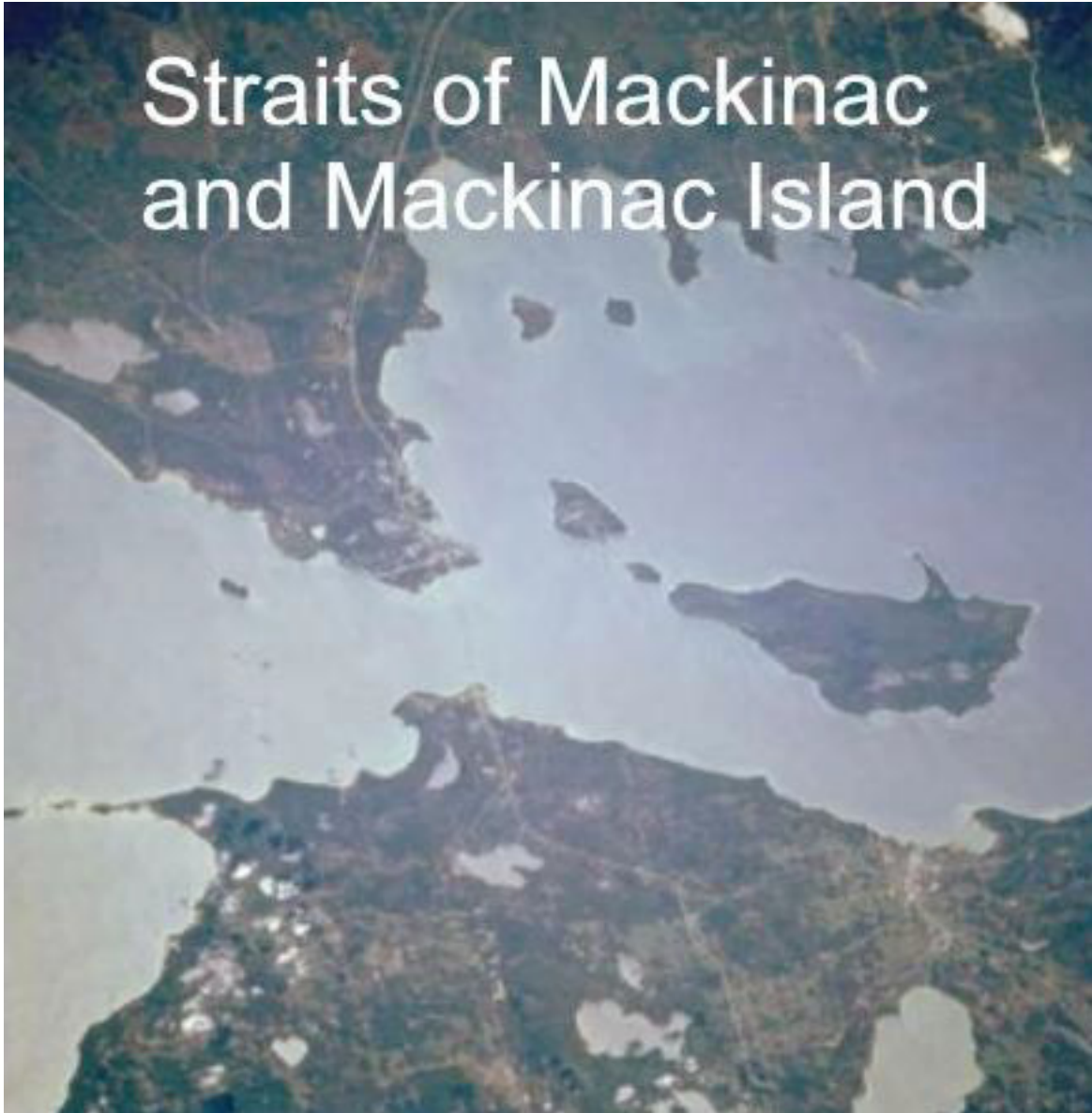


I believe in the gentle doctrines of the early Friends – particularly that of “the indwelling light,” as the first great teacher and guide, it being ... the true interpreter of the Sacred Volume whose pages bear record of this divine manifestation to mankind from the earliest ages.... At the hour of death I hope for grace from on high, to resign myself with childlike confidence into the hands of our Heavenly Father, the great and good Creator, whose protecting care over me in my past youth, manhood, and old age, I have so often witnessed.... As a birthright member of the Society of Friends, I would express my continued faith in its Christian doctrines, so simple and true, so human and charitable when rightly observed, feeling that in the future they will be seen to be the truest interpretation of the Christian truth. So, asking God’s blessing upon those who may be called upon to suffer for its principles I would close.

RELIGIOUS SOCIETY OF FRIENDS

Thoreau jotted down that he and Horace Mann, Jr. had reached the “Mackinaw House” on [Mackinac Island](#). By 1838 this island, which had started out as the Michilimackinac “Green Turtle” burying ground, had already become firmly established as a summer health resort, catering in particular to those suffering from seasonal allergies such as hay fever. In fact some sufferers had to be turned away in earlier years for lack of accommodations. By 1861 there had been a building boom –although the Grand Hotel and the Michigan State Park were still a number of years in the future– and Thoreau and Mann were able to choose among several hotels and boarding houses. It was unseasonably cold and Thoreau was so ill at this point that he spent most

of his time sitting by the fire with Mann bringing [botanical](#) collections in to him. Be it noted that [Margaret Fuller](#) and [William Cullen Bryant](#) had been on Mackinac Island and young Mann had himself been there before as a boy of 13 with his father.



We may recollect a letter written by Horace Mann, Sr. on Mackinac Island in 1857: “I never breathed such air before, and this must be some that was clear out of Eden, and did not get cursed. I slept every night under sheet, blanket, and coverlet, and no day is too warm for smart walking and vigorous bowling. The children are crazy

with animal spirits.”¹⁹⁰



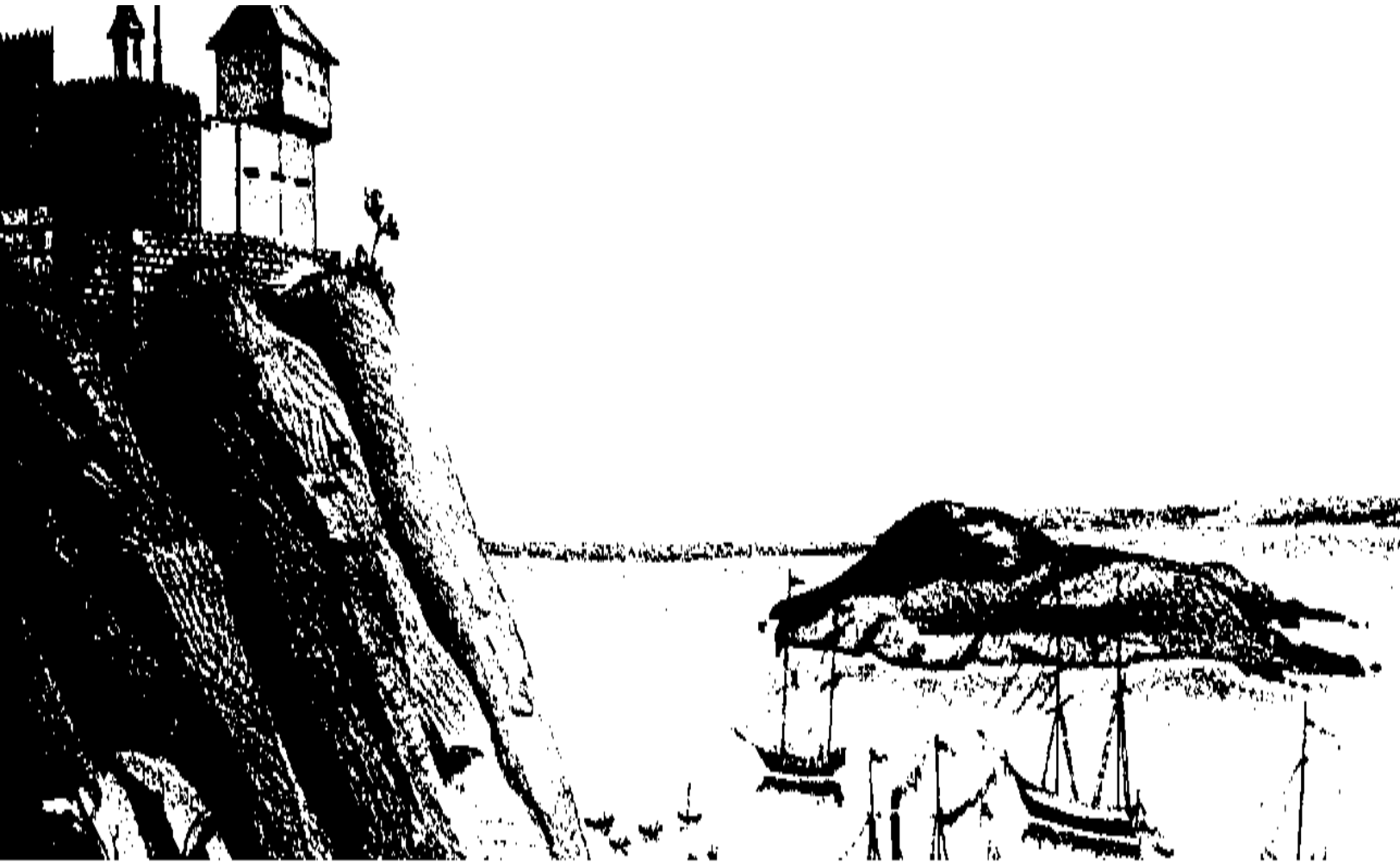
Therefore, it is clear, Thoreau did not return to [Concord](#) via the Great Lakes by accident, nor stop off at Mackinac Island by happenstance.

ASTRONOMY

190. See pages 157-163 of J.A. Van Fleet, OLD AND NEW MACKINAC (Ann Arbor, 1870).

ASTRONOMY

ASTRONOMY



Michilimackinac “Green Turtle” Island on Lake Michigan



July 1, Monday: [Theodore Sedgwick Fay](#) had since 1853 been Minister Resident for [Switzerland](#) and Liechtenstein, at Berne. Upon the election of Abraham Lincoln as president, however, for political reasons, he felt he needed to resign. He would reside during his retirement at Berlin.

On this night and the following night, a maximum tail length of 118 degrees were being reported for the great [comet II Tebbutt](#). The tail was reaching south, from the head directly below Polaris near the northern horizon, to well past the zenith of the southern skies, and was all night rotating about the pole.

SKY EVENT

ASTRONOMY

ASTRONOMY

Mid-August: Last naked-eye visibility of the [great comet of 1861](#).

SKY EVENT

1862

[Alvan Graham Clark](#) used his newly constructed refractor, the largest in the world, to view for the first time Sirius, the white-dwarf companion to the Dog Star.

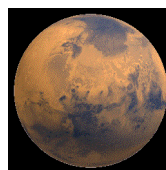
ASTRONOMY



There were two comets in this year, one of them the [comet Schmidt](#) which passed 0.1 astronomical units from Earth, and the other of them a return of the [periodic comet Swift-Tuttle](#). In addition, for the first part of the year, the [great comet of 1861](#) was still observable by telescope until eventually it got out as far as the orbit of Jupiter and faded away.

SKY EVENT

During the perihelic opposition of [Mars](#), a new map of the planet's surface features was prepared. Most, but not all, astronomers were finding themselves persuaded at this point that they were gazing upon seas and continents. Some supposed that they were instead viewing deserts and spots of vegetation, pointing out that were any substantial portion of the surface of this red planet covered with water, we would be seeing some sort of reflection of the sun, appearing in the center of the planet's disk as a starlike image — and that nobody had as yet claimed to have observed such a reflective phenomenon.



ASTRONOMY



ASTRONOMY

ASTRONOMY

May 1, Thursday: Last telescopic observation of the great [comet](#) of 1861, which at this point must have been reaching about the orbit of Jupiter.

[SKY EVENT](#)

July 15, Tuesday: Cochise, leading some 700 warriors at Apache Pass, got the drop on the van of Carleton's "California Column."

Lewis Swift of Marathon NY was on the lookout for a [comet](#) he had read about in the newspaper and was ambushed, not by it, but by yet another one, one which would be granted the designation "[III Swift-Tuttle](#)." This comet and the comet 1866 I Tempel-Tuttle have produced the great Perseid and Leonid meteor swarms.

[PERSEID METEOR SHOWER](#)

[LEONID METEOR SHOWER](#)

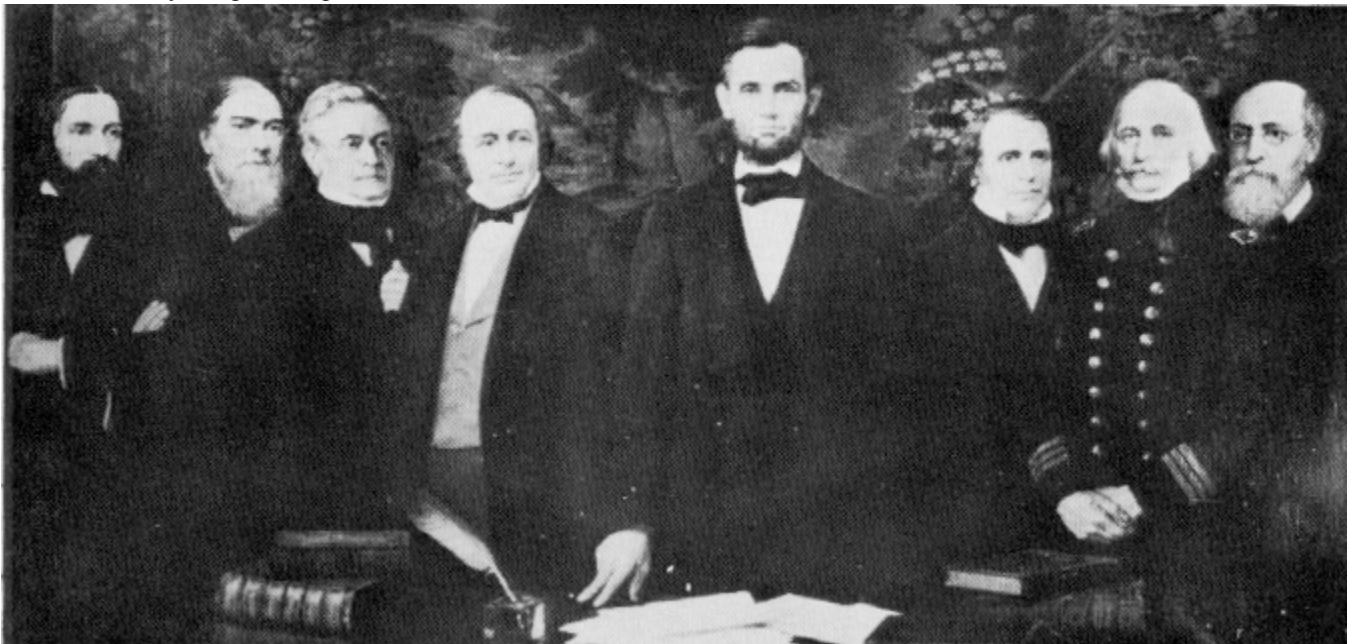
[Comet III Swift-Tuttle](#), not a small body at all, and with a potential impact speed of 60 kilometers per second, and with a generally intersecting trajectory, repeatedly whipping by us, has been described as the single most dangerous object known to humankind — somewhat more deadly even than your proverbial speeding bullet.

In all, over a lifetime –and he would live a long time– this Lewis Swift would discover at least thirteen such new comets (he may well have been an insomniac, but for sure he was a man who was behaving himself).

[ASTRONOMY](#)

1863

March 3, Tuesday: In our nation's puzzle palace on the Potomac, in the wee small hours of the 37th Congress, a decade of plotting and conspiring by the "Lazzaroni" of Professor [Louis Agassiz](#) of [Harvard College](#) came to culmination in the creation of a new disciplinary "jury" to be known as the National Academy of Sciences. The Lazzaroni had prepacked this august new secret body of administrators, by name in the enabling legislation, with non-scientist apparatchiks "who never turned a pen or did a thing for science," officers they had recruited from the Army and Navy, and apparatchiks from the federal bureaucracy of Washington DC, whose chief or only asset was expertise in gameplaying.¹⁹¹ From the very first it was clear that the game plan was not so much discovery as the control, by safe people, of the processes by which things may be discovered. Here they are clustered close around the President, so that some of his legitimacy will rub off on them or so they can pick his pocket:



"Scientists have power by virtue of the respect commanded by the discipline. We may therefore be sorely tempted to misuse that power in furthering a personal prejudice or social goal – why not provide that extra oomph by extending the umbrella of science over a personal preference in ethics or politics?"



– [Stephen Jay Gould](#)
 BULLY FOR BRONTOSAURUS
 NY: Norton, 1991, page 429

¹⁹¹. It was [Louis Agassiz](#) who referred to it as a "jury." He was gloating about how "the malcontents will be set aside or die out and the institution survive," and urging his co-conspirators to further such scheming because "it now remains for us to give it permanency by our own doings." Joseph Leidy appropriately commented that the "grand humbug" was "nothing more than the formation of an illiberal clique based on Plymouth Rock." Even the founder of MIT, William Barton Rogers, was made fearful by these developments, and how they had been implemented behind the backs of the American researchers by secret political negotiations with non-scientists about which "only two or three of the men of science knew anything until ... announced in the newspapers."

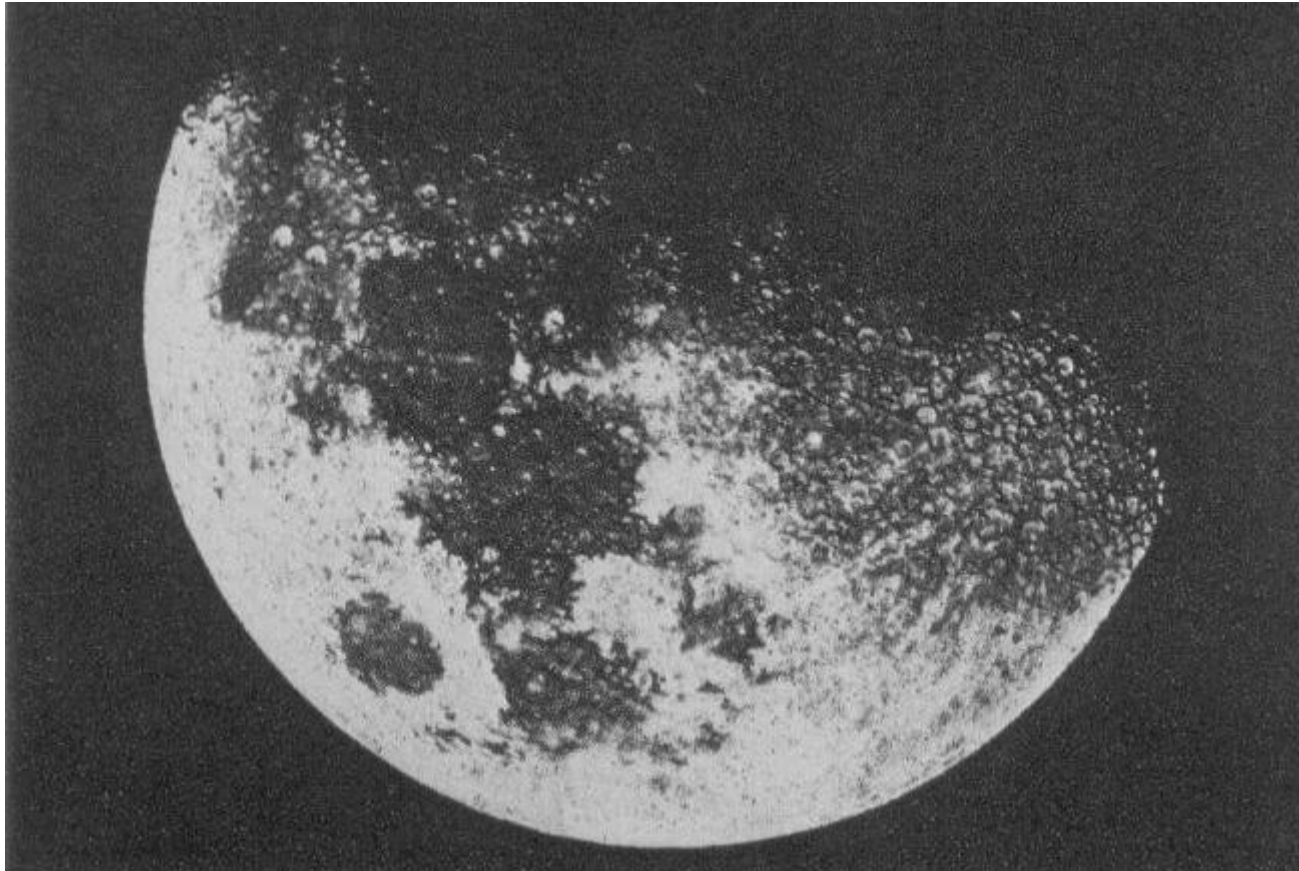
1864

[Benjamin Apthorp Gould](#), with the support of his spouse Mary Apthorp Quincy Gould, was able to create a private observatory at Cambridge at which he might conduct his astronomical studies.

ASTRONOMY

1865

Generation of the 1st printed image of a photograph of the moon:



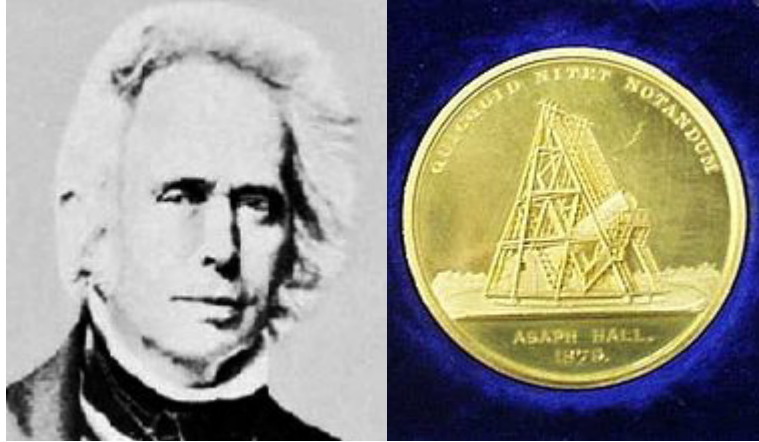
PHOTOGRAPHY

PRESS

ASTRONOMY

ASTRONOMY

[George Phillips Bond](#) was awarded the gold medal of the Royal Astronomical Society.



A connection was made at this point, between the great Leonid meteor shower which occurs annually and the 1866 [comet P/Tempel-Tuttle](#), which was completing its orbit around the sun every 33 years.

SKY EVENT

ASTRONOMY

ASTRONOMY

At a college he was starting in Cambridge, Matthew Vassar hired the astronomer [Maria Mitchell](#) to be Professor of Astronomy and Director of the Observatory.



ASTRONOMY

CAUTION: OBJECTS VIEWED THROUGH A TELESCOPE CAN APPEAR CLOSER THAN THEY ACTUALLY ARE — After teaching at Vassar College for some time, Professor Mitchell would discover to her dismay that despite her reputation and experience, she had been receiving less pay than a number of junior male faculty members. Insisting on a salary increase, she would get it — but the record is silent as to whether that salary increase was such as to create actual parity of reward between her and the male Vassar faculty of equivalent standing.

October 19: There was an annular [eclipse](#) of the [sun](#) (#7325) from Washington state to Florida.

**1866**

[Benjamin Apthorp Gould](#) was able to employ the Atlantic cable to establish accurate longitude relations between Europe and America. His measurements of Lewis Morris Rutherfurd's photographs of the Pleiades had made of him one of the pioneers in the use of the camera as an instrument of precision and he would secure, at Córdoba in Argentina, 1,400 negatives of southern star clusters the reduction of which would require the remaining period of his life.

When Biela's Comet was supposed to appear during this year after not being seen when expected in 1859, it was again nonapparent. It would seem that this [comet](#) had disintegrated into what we now experience as the [Andromedid meteor shower](#), a shower that travels in virtually the same orbit and had been being observed at least since 1741.

SKY EVENT

November: Prior to the anticipated Leonid meteor shower of this year, Ernst Tempel and Horace Tuttle had independently discovered a dim [comet](#). After observing the comet for several weeks, its orbit was calculated at 33.17 years. The sheer number of meteors startled observers in Europe, who scrambled to count the numerous meteors and determine the radiant position. An orbit was calculated for the meteoroids assuming a period of 33 years and a mental connection began to be made at this point, between this great Leonid storm which occurs annually and the P/Tempel-Tuttle comet which completes its orbit around the sun every 33 years (the orbits were greatly similar).

SKY EVENT

November 14, Tuesday: [Henry Thoreau](#) had commented on an observatory, that he had slept outside of while hiking in the summer of 1844, in A WEEK ON THE CONCORD AND MERRIMACK RIVERS:

[A WEEK](#): This observatory was a building of considerable size, erected by the students of Williamstown College, whose buildings might be seen by daylight gleaming far down in the valley. It would be no small advantage if every college were thus located at the base of a mountain, as good at least as one well-endowed professorship. It were as well to be educated in the shadow of a mountain as in more classical shades. Some will remember, no doubt, not only that they went to the college, but that they went to the mountain. Every visit to its summit would, as it were, generalize the particular information gained below, and subject it to more catholic tests.



ASTRONOMY

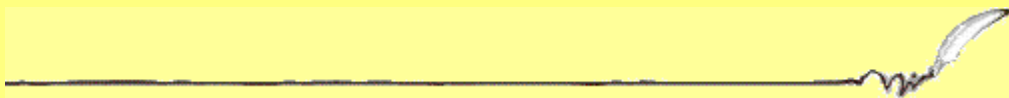
ASTRONOMY

[Waldo Emerson](#), upon looking through the [Alvan Clark telescope](#) at this Williams College Observatory, made the following entry in his journal:

I saw tonight in the observatory, through Alvan Clark's telescope, the Dumb-Bell nebula in the Fox and Geese Constellation; the four double stars in Lyra; the double stars of Castor; the two hundred stars of the Pleiades.... I have rarely been so much gratified.

Of all tools, an observatory is the most sublime. And these mountains give an inestimable worth to Williamstown and Massachusetts. But, for the mountains, I don't quite like the proximity of a college and its noisy students. To enjoy the hills as a poet, I prefer the simple farmers....

What is so good in a college as an observatory? The sublime attaches to the door and to the first stair you ascend; - that this is the road to the stars. Every fixture and instrument in the building, every nail and pin, has a direct reference to the Milky Way, the fixed stars, and the nebulae, and we leave Massachusetts and history outside at the door when we come in.



1866

November: Prior to the anticipated Leonid meteor shower of this year, Ernst Tempel and Horace Tuttle had independently discovered a dim [comet](#). After observing the comet for several weeks, its orbit was calculated at 33.17 years. The sheer number of meteors startled observers in Europe, who scrambled to count the numerous meteors and determine the radiant position. An orbit was calculated for the meteoroids assuming a period of 33 years and a mental connection began to be made at this point, between this great Leonid storm which occurs annually and the P/Tempel-Tuttle comet which completes its orbit around the sun every 33 years (the orbits were greatly similar).

SKY EVENT

1868

The Republic of the Argentine charged [Benjamin Apthorp Gould](#) to organize at Córdoba a national observatory.¹⁹²

ASTRONOMY

192. "The Southern Hemisphere holds up half the sky."



ASTRONOMY

ASTRONOMY

There was a new edition of Hiram Mattison's edition of [Elijah Hinsdale Burritt's A PLAN OF THE SOLAR SYSTEM EXHIBITING ITS RELATIVE MAGNITUDES AND DISTANCES](#) (New York: Mason Brothers).

ASTRONOMY

Although Eta Carinae had suddenly brightened during April 1843 from being a star of only the 4th magnitude into being the 2d brightest star in all the starry heavens, since then it had gradually been dimming — and from this point forward it would no longer even be visible to the naked eye.

In an entirely unrelated factoid of astronomy, we now understand that in approximately this year the youngest known supernova in our Milky Way galaxy occurred. It happened to occur toward the center of the galactic nucleus, in an area previously obscured from our view at optical wavelengths by space dust, so the event was not known, and not precisely dated, until the right observational equipment became available. Mistakenly, we at first assigned the explosive event to approximately the year 1680. Recently, by use of a radio observatory in New Mexico and by use of NASA's Chandra X-ray Observatory in orbit, the year 1868 was established as the year of the explosive event.

SKY EVENT

1869

[Benjamin Apthorp Gould](#) became the initial director of the Argentine National Observatory (today known as the Observatorio Astronómico de Córdoba of the National University of Córdoba). While there, he and four assistants would use a newly developed photometric methodology to map the night skies of the southern hemisphere. As if he didn't have enough to do, in this year he issued a volume of Military and Anthropological Statistics.

ASTRONOMY

John Tyndall of Ireland described experiments in the scattering of light as it passed through aerosols.



ASTRONOMY

ASTRONOMY



July: Near Los Angeles, California, blood of a thick, vivid red hue containing hairs and portions of internal organs fell out of a clear sky over two acres of a cornfield. The shower was witnessed by a funeral party that included members of the clergy:

WALDEN: Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness.... At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of Nature. We must be refreshed by the sight of inexhaustible vigor, vast and Titanic features, the seacoast with its wrecks, the wilderness with its living and its decaying trees, the thunder cloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.... I love to see that Nature is so rife with life that myriads can be afforded to be sacrificed and suffered to prey on one another; that tender organizations can be so serenely squashed out of existence like pulp, – tadpoles which herons gobble up, and tortoises and toads run over in the road; and that sometimes it has rained flesh and blood!

RAINS OF BLOOD, &C.

1870

Although plate glass sheets as large as 84"x60" had by this year become possible, little of this sort of thing was as yet being produced.

GLASS WINDOWS

Most glass plate shop windows, in this period probably still consisted of the sort of windows that are evident in this photograph made sometime between 1865 and 1868, supplied to the Kouroo Contexture by Leslie Perrin Wilson of the Concord Free Public Library. The shop on the left is 23-25 Main Street in beautiful downtown Concord, which was [John Stacy](#)'s business which his son Albert had by 1850 taken over. The shop on the right is one that [Albert Stacy](#) set up after the Civil War. This type of shop window might more appropriately be referred to as a glass plate window rather than a plate glass window because it was being built up from multiple polished glass plates set into a frame rather than, as today, of one solid slab of almost invisible glass entirely filling a window space:



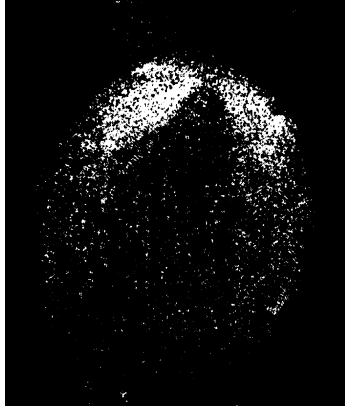
1871

John William Strutt, 3d Baron Rayleigh, presented a general law which related the intensity of light scattered from small particles to the wavelength of the light when the dimensions of the particles were much less than the wavelength. Also, he fashioned a "zone plate" which was able to focus a beam of light by Fresnel diffraction.

ASTRONOMY

ASTRONOMY

December 31, Sunday: A [comet](#):



SKY EVENT

1872

November 27, Wednesday: Biela's Comet had been predicted to return this month, but instead of the [comet](#) what we got was one of the very strongest meteor showers which we have ever recorded. Sometimes there were more than 10,000 streaks in the sky per hour. Clearly, the comet had completed the disintegration which it had so long ago begun.

SKY EVENT

1873

There was a new edition of Hiram Mattison's edition of [Elijah Hinsdale Burritt](#)'s A PLAN OF THE SOLAR SYSTEM EXHIBITING ITS RELATIVE MAGNITUDES AND DISTANCES (New York: Mason Brothers).

ASTRONOMY

The firm of [Alvan Clark](#) & Sons of Cambridge MA provided a 24-inch lens for the [US Naval Observatory](#) in Washington DC (this telescope is still operational).

GEORGE BASSETT CLARK

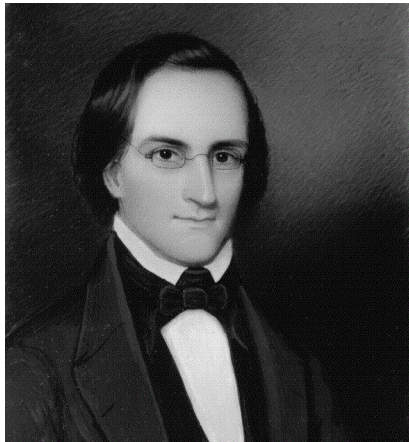
ALVAN GRAHAM CLARK



1874

Benjamin Apthorp Gould completed *URANOMETRIA ARGENTINA* (this massive work would not be published until 1879, and in 1883 would earn him the gold medal of the Royal Astronomical Society; to see what this was like you might take a look at an updated version of it, at www.uranometriaargentina.com/).

ASTRONOMY



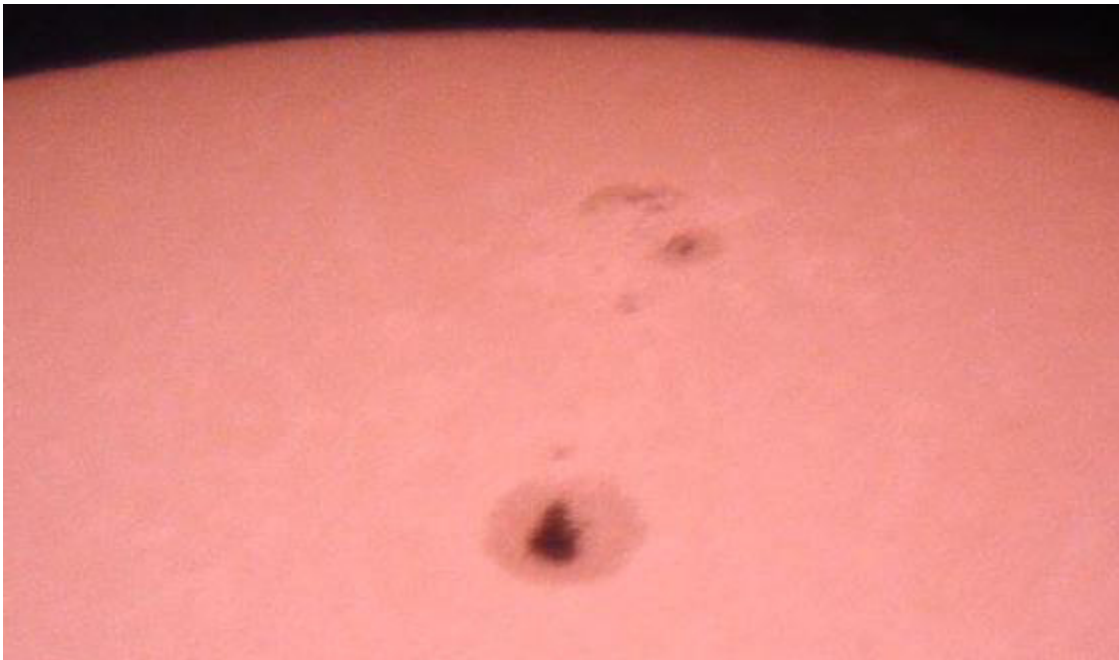
Marie Alfred Cornu of France described a graphical approach, the “Cornu spiral,” to the solution of diffraction problems.

HISTORY OF OPTICS

1875

William Stanley Jevons suggested that, since [sunspots](#) influence the weather and weather influences crop yields, there might be a relationship between sunspots and the cycles of the economy.

ASTRONOMY



John Kerr of Scotland demonstrated the quadratic electro-optic effect, the “Kerr effect,” in glass.

HISTORY OF OPTICS

1876

This was the [Harvard Observatory](#) in this year:



HARVARD COLLEGE

NEW “HARVARD MEN”

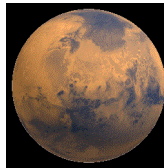
There was a new edition of Hiram Mattison’s edition of [Elijah Hinsdale Burritt](#)’s A PLAN OF THE SOLAR SYSTEM EXHIBITING ITS RELATIVE MAGNITUDES AND DISTANCES (New York: Mason Brothers). The preface to this 1876 edition alleged that overall, since the initial edition way back in 1833, more than 300,000 copies had been sold.

ASTRONOMY

1877

Jacob Schoellkopf purchased [Niagara Falls's Hydraulic Canal](#) for \$71,000.

Giovanni Virginio Schiaparelli's map of the surface features of the planet [Mars](#), which would help touch off the "[canals](#) of Mars" furor which would play such a role in the subsequent mythifications of this planet. Actually, in recycling the previous term "canale" as a designator on this map, that term was being utilized more or less as a synonym for river, "fiume," and thus, to the astronomers involved at least, indicated surface features which were presumably completely natural rather than having been created by some race of extraterrestrial beings. Such a term should have been transliterated from the Italian as "channel" but for egregious reasons it would become "canal."



ASTRONOMY



"[Mars](#) is essentially in the same orbit ... somewhat the same distance from the Sun, which is very important. We have seen pictures where there are canals, we believe, and water. If there is water, that means there is oxygen. If oxygen, that means we can breathe."

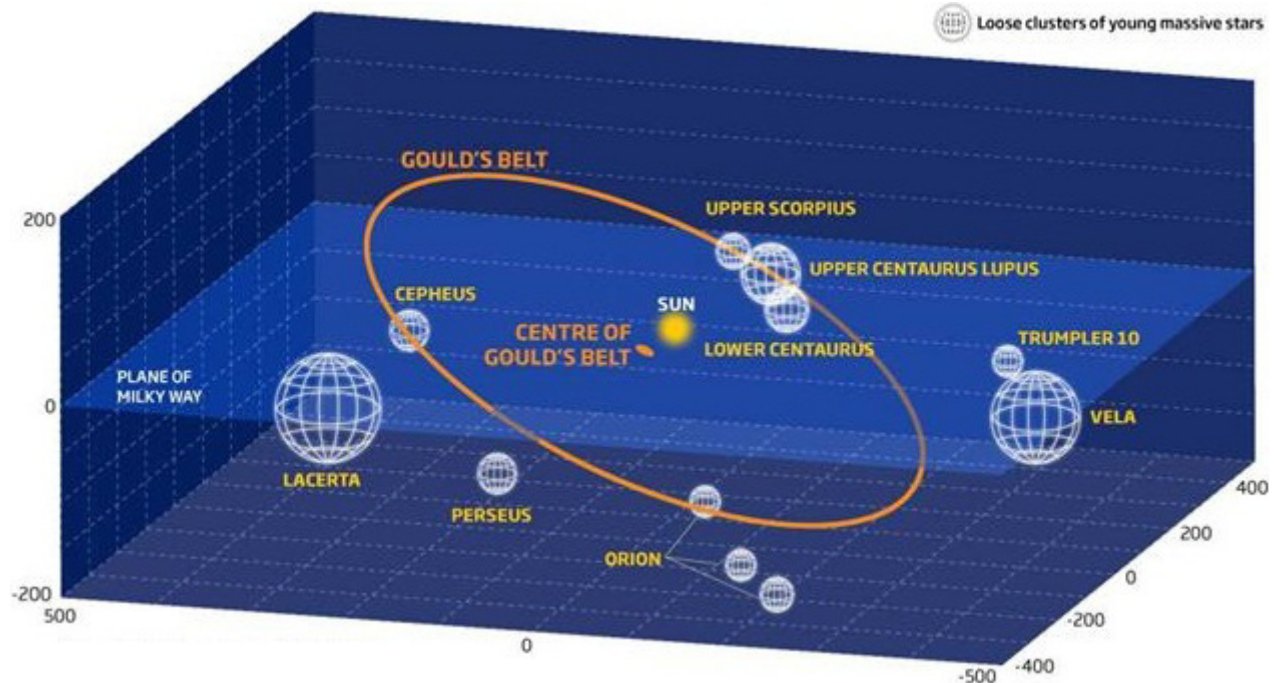
— J. Danforth Quayle



ASTRONOMY

ASTRONOMY

[Benjamin Apthorp Gould](#) noted a large-scale feature of the Milky Way Galaxy. Our solar system happens to be close to the center of a rotating ring of stars, tilted with respect to the main plane of the Milky Way Galaxy, which this tilted rotating ring includes some of the brightest stars in our night sky.



We have come to characterize this tilted rotating ring as the “Gould Belt.”

ASTRONOMY

August 11, Saturday: At the [US Naval Observatory](#) in Washington DC, Asaph Hall discovered a satellite of [Mars](#), designating it as Deimos.

ASTRONOMY

August 18, Saturday: At the [US Naval Observatory](#) in Washington DC, Asaph Hall discovered another satellite of [Mars](#), Phobos.

ASTRONOMY

1878

The firm of [Alvan Clark](#) & Sons of Cambridge, Massachusetts provided a 30-inch lens for the Pulkovo Observatory near St. Petersburg in Russia. (The facility would be destroyed during WWII.)

GEORGE BASSETT CLARK
ALVAN GRAHAM CLARK





1879



Josef Stefan of Austria presented the generalization that the total radiant energy emitted from a body per unit time would be proportional to the fourth power of the absolute temperature of that body.

Cleveland, [Ohio](#) became the world's 1st city to be lighted electrically (at least for a few hours) when Charles Brush successfully demonstrated arc lights on its streets.

Joseph Swan of England demonstrated an electric lightbulb with a carbon filament.

Thomas Alvin Edison developed a carbon-filament electric lightbulb that could be reliably and economically manufactured, with ordinary cotton as the source of its carbon filament.

1882

September: During our time we have not been favored by great comets; our Hale-Bopp was a disappointment and even our Halley's Comet was this time quite unspectacular. To understand the 19th Century, we have to imagine a period of rather frequent and indeed very spectacular sky ghosts and apparitions. The Great Comet of February 1843  during Thoreau's lifetime, according to a hypothesis by Brian Marsden, actually had been merely a fragment of a single gigantic comet that had been regularly lighting up the earth's sky since some point between 18,000BCE and 8,000BCE.  This "[Great September comet of 1882](#)" was merely another

ASTRONOMY

fragment of this same repeatedly disintegrating sungrazer comet that had again split up on its pass in 1106 CE, and yet it was casting a light upon the earth two orders of magnitude brighter than that cast by a full moon — indeed it was easily visible in broad daylight!

ASTRONOMY

December 6: David Peck Todd (1855-1939) had made his way to Southern California to photograph the transit of Venus from the summit of Mount Hamilton, where a solar photographic telescope made by the Boston optical firm [Alvan Clark & Sons](#) waited among the stacks of bricks and timbers from which Lick Observatory was rising. As the transit unfolded on this day, the Amherst College astronomer obtained a superb series of plates under perfect skies. His 147 glass negatives would be carefully stored in the mountain vault, but astronomers would turn to other techniques for determining the scale of the solar system and these plates would remain untouched and eventually be forgotten.

ASTRONOMY

ASTRONOMY

ASTRONOMY

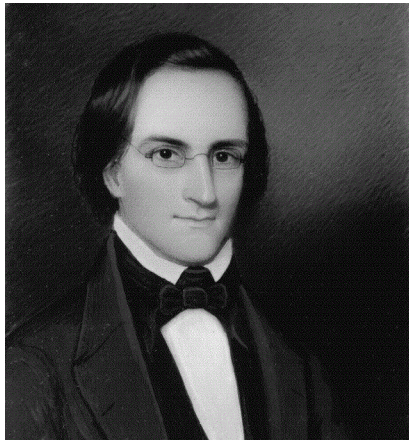
The project had been to measure accurately the distance between the earth and the sun, by means of a measurement of the transit of Venus. The idea was that, since we cannot measure this distance with a yardstick, we might substitute a clock. The proposal was to measure the distance with a clock, by noting the exact time at which the disk of Venus touched the edge of the disk of the sun, when observed by qualified observers positioned at various known locations on the surface of the earth. From the differences between these time measurements, we were to triangulate the exact distance to the sun. Previous observations had been unsatisfactory, but in this year the observations were good, and when the results came in, it was obvious that the entire project had been wrongheaded from the get-go. Venus's shape distorted so much as it passed over the limb or edge of the sun, that there was just no way to make an objective and accurate time measurement.

Thus, when the transit of Venus occurred again on June 8, 2004, astronomers simply didn't care.

The next transits will occur on June 6, 2112, while some of us will still be alive, and December 11, 2117, by which time assuredly all of us will be long since dead and buried.

1883

[Benjamin Apthorp Gould](#) received the gold medal of the Royal Astronomical Society.



ASTRONOMY

ASTRONOMY

The firm of [Alvan Clark & Sons](#) of Cambridge, Massachusetts provided a 28-inch lens¹⁹³ for the University of Virginia at Charlottesville, Virginia (this telescope is still operational).

GEORGE BASSETT CLARK

ALVAN GRAHAM CLARK



1884

[Benjamin Apthorp Gould](#) published a zone-catalogue of 73,160 stars.

ASTRONOMY

June 1, Sunday: [Benjamin Apthorp Gould](#) made the final definite sighting of the “[Great September comet of 1882](#).”

ASTRONOMY

1885

[Benjamin Apthorp Gould](#) published a general catalogue compiled from meridian observations of 32,448 stars. He returned from Argentina to Cambridge, Massachusetts.

ASTRONOMY

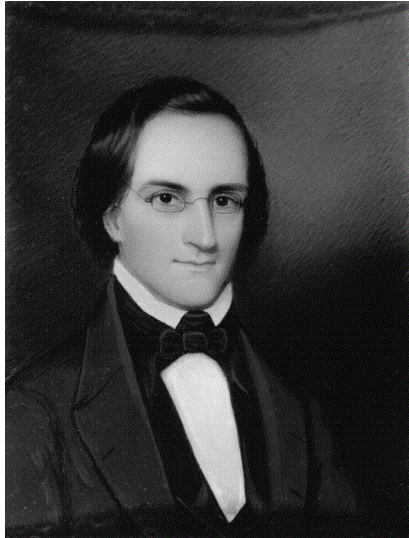
November 27, Friday: On this night we experienced an even stronger meteor shower than the strongest one previously on record, which had come on the night of November 27, 1872. Sometimes there were as many as 75,000 streaks in the sky per hour. (This is a rate which is exceeded only during the brief peak outbursts of the Leonid swarm.) Clearly, the periodic [comet Biela](#) had completed the disintegration which it had so long ago begun.

SKY EVENT

¹⁹³. Now you can appreciate why it is has been, in keeping track of the development of the science of [astronomy](#), all along we have been keeping track as well of the development of techniques for the manufacture of glass.

1887

[Benjamin Apthorp Gould](#) was designated as the initial recipient of a new reward, the James Craig Watson Medal for Valuable Labors in Promoting the Progress of Astronomical Science.



ASTRONOMY



August 19: Four [German](#) warships arrived off Apia, Samoa and landed about a hundred soldiers. The government officials of King Malietoa fled as best they might.

[Alvan Clark](#) died in Cambridge, Massachusetts.

[Spencer Fullerton Baird](#) died at Wood's Hole, Massachusetts.

SPENCER F. BAIRD DEAD.

HIS LIFE WORK BROUGHT TO A CLOSE AT WOOD'S HOLL.

WASHINGTON, Aug. 19.—Prof. Spencer F. Baird, head of the Smithsonian Institution and the United States Fish Commission, died at 3:45 o'clock this afternoon at Wood's Holl, Mass., where he had been sick for some time. His body will be brought here for burial.

Spencer Fullerton Baird was of mixed Scotch, English, and German descent. His ancestors were preachers, surveyors, bankers, and lawyers of New-Jersey and Pennsylvania. One of them was so effective a war preacher during the Revolution that a price was set upon his head by the British Government, and it was after this robust patriot, the Rev. Elihu Spencer, that Prof. Baird took his distinguishing name. The father of the dead scientist was a lawyer of Reading, Penn. He is described as a man of high culture and close observation, and an ardent lover of outdoor pursuits. His sons inherited his tastes.

At the age of 14 Spencer Baird, with his elder brother William, commenced a collection of game birds found in Cumberland County, Penn., which afterward was made the nucleus of the present magnificent Smithsonian Museum. The brothers contributed papers to the Philadelphia Academy of Sciences, which received marked attention, and soon afterward the great ornithologist, Audubon, became interested in Spencer Baird, and established a friendship with him which continued until Audubon's death and did much to shape the future career of his gifted protégé. Audubon presented him with a large part of his collection of birds, and young Baird in return contributed many facts and specimens to aid in the production of Audubon's works.



Prof. Baird graduated from Dickinson College at the age of 17, and subsequently studied medicine in New-York, although he never followed that profession. In 1845, when he was 22 years old, he was elected Professor of Natural History of the college at which he had graduated. Two years later he became associated with the distinguished Agassiz, and projected with him a work on the fresh water fishes of the United States, which was never completed. During all this period it was his habit to make extended pedestrian tours for the purpose of extending his knowledge and enlarging his natural history collections. So great were his powers of physical endurance that he had been known to cover nearly 60 miles on foot in one day between sunrise and rest.

In 1850 Prof. Baird was elected Assistant Secretary of the Smithsonian Institution, with which his name and fame have since been indissolubly connected. On the death of Prof. Henry he became the head of the institution. In 1871 he was appointed by President Grant United States Commissioner of Fisheries, an office which added largely to his responsibilities and nothing to his compensation. The services he rendered in this capacity in increasing the food supply of the world would alone justify a national monument to his memory.

But Prof. Baird's history is the history of the systematic zoology of the United States. A chronological catalogue of his works, prepared by order of the Smithsonian Institution and only carried down to 1882, includes over 1,000 titles. His services to science and natural history were rewarded by medals from the Acclimatization Societies of Australia, France, and Germany. He was a member of the leading scientific associations of England, Austria, France, Germany, Holland, Portugal, and New-Zealand. Over 33 distinct genera and species in North, South, and Central America and the West Indies have been named in his honor.

The extent of Prof. Baird's labors and the practical service he has rendered as head of the Smithsonian Institution cannot be overstated. It is a melancholy fact that his last hours were embittered, and, according to the testimony of Prof. Goode, his assistant, and other associates, his life was perceptibly shortened by causeless imputation. Instigated by a New-York newspaper, cast upon his administration of the large fund placed at his disposal as head of the Fishery Commission. There never was the slightest foundation for those charges. They were investigated by Mr. Randall's appropriation committee and found to be absolutely baseless, and the appropriation was continued without change. But the unjust suspicion struck home to Prof. Baird's sensitive mind, and, with a brain and constitution enfeebled by incessant and long-continued overwork, hastened his death.

The New York Times

1888

[Alvan Graham Clark](#) provided a 36-inch lens for the Lick Observatory atop Mount Hamilton in Southern California (this telescope is still operational).



1890

During this decade, oversized windows known as “cottage” or “front” windows would be becoming popular. Such windows needed, for reasons of ventilation, a transom above them, and were seldom larger than 48"x68" inclusive of the transom. Frank Lloyd Wright’s horizontal emphasis, known as Prairie School architecture, would mean the installation of wide windows rather than tall ones. Wright’s designs would employ decorative ribbon windows or art glass, but knockoffs of his style would incorporate oversized windows of plain plate glass. Sash-and-blind companies would be able to meet this market demand by merely re-orienting their existing product, to wit, hanging ordinary cottage windows sidewise in their frames. The transom would become a pair of ventilation casements or double-hung sashes. These new oversized windows, mimicking commercial “Chicago” windows, would for awhile be known as “landscape” sash. The center sash would still rarely be larger than 48" square, but the overall window assembly would come to have a predominately horizontal axis spanning 8' or more.

GLASS WINDOWS



ASTRONOMY

ASTRONOMY

1891

During this year and the following year, L. Mach and L. Zehnder would separately describe what has since become known as the Mach-Zehnder interferometer. This device would be able to monitor changes in refractive index, and hence density, in compressible gas flows. This optical instrument has subsequently found application in the field of aerodynamics.

HISTORY OF OPTICS

1893

The [US Naval Observatory](#) in Washington DC was relocated from Foggy Bottom, near the Lincoln Memorial, to a marginally preferable location atop Observatory Hill overlooking Massachusetts Avenue. Here is a satellite photo of that facility — a photo deliberately blurred during the Bush administration so that terrorists would not be able to identify the precise location within this circle of Vice President Dick Cheney's residence:

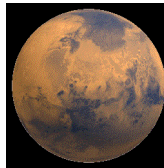


When Joe Biden began to occupy the Vice Presidential Residence, the government ceased to blur this image (Joe's silly sometimes, but he's not so evil that we're afraid anyone would want to hurt his family).

ASTRONOMY

1894

May 22, Tuesday: James Russell Lowell's advantaged cousin Percival Lowell presented his latest hot theory to the Boston Scientific Society — that he had been able to establish by careful observation of the canal markings on the face of [Mars](#) that said planet was inhabited by intelligent beings who were elaborately modifying their environment.



ASTRONOMY



"[Mars](#) is essentially in the same orbit ... somewhat the same distance from the Sun, which is very important. We have seen pictures where there are canals, we believe, and water. If there is water, that means there is oxygen. If oxygen, that means we can breathe."

— J. Danforth Quayle



1895

The Boatman's Association formed recently by [Erie Canal](#) workers to protest against unfair distribution practices, went on strike. A Captain Philips and his son were killed by boatmen while trying to take on a load of lumber in Tonawanda.

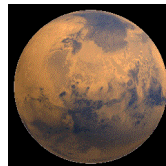
Construction began on the 2d enlargement of the [Erie Canal](#).

[Niagara Falls](#)'s [Hydraulic Canal](#) was widened to 100 feet and deepened to an average of 10 feet.

In the Netherlands, D. J. Korteweg and his student G. deVries were able to derive a non-linear partial differential equation that would mimic the behavior of the solitary wave described by John Scott Russell, the wave form of waves in shallow water. This Korteweg-deVries (KdV) equation would play an important role in the development of a mathematical description of solitons.

HISTORY OF OPTICS

Percival Lowell began to publicize, in POPULAR ASTRONOMY and in [The Atlantic Monthly](#) and in this book MARS, that the canals of [Mars](#) were an intelligent race's response to the progressive desiccation of their home environment, and that they represented irrigation canals to draw the remaining water toward still-fertile oases. The more impressionable of our society were of course fascinated:



ASTRONOMY



"[Mars](#) is essentially in the same orbit ... somewhat the same distance from the Sun, which is very important. We have seen pictures where there are canals, we believe, and water. If there is water, that means there is oxygen. If oxygen, that means we can breathe."
 — J. Danforth Quayle



1896

[Alvan Graham Clark](#) provided a 24-inch lens for the Lowell Observatory in Flagstaff, Arizona (this telescope is still operational).



1897

The Marsh Plate Glass Company of Floreffe, Pennsylvania developed a continuous oven (lehr) for annealing plate glass that would reduce the carefully controlled cooling time of the glass from three days to three hours.

GLASS WINDOWS

June 9: [Alvan Graham Clark](#) provided a 40-inch lens for the Yerkes Observatory at Williams Bay in Wisconsin (this telescope is still operational and the lens is still the largest refractor lens in the world), and in this year he died in Cambridge, Massachusetts (during his lifetime he had discovered a total of 16 double stars).

1898

Pilkington Glass introduced hexagonal rolled wired cast glass.

SHEETS OF GLASS



1899

Disastrous flooding of the Nile River valley. According to [Nilometer](#) records, other disastrous floods in [Egypt](#) had occurred in the years 1200CE, 1230, 1450, 1553, 1641, 1650, 1694, 1715-1716, 1783, and 1877, would occur again in 1913, and then in 1972.

The tomb of Pharaoh Tuthmosis I (1,504 BCE-1,492 BCE) in the Valley of the Kings (#38) was re-excavated by Victor Loret (1859-1946).

It was by this point well established that the return of [comet P/Tempel-Tuttle](#) and a pronounced Leonid [meteor](#) swarm occurred every 33rd year. This year's sky show was eagerly anticipated, and many meteors were indeed observed but the expected comet did not appear. The sharp main peak of the Leonids which had been anticipated also was not observed. The rate of meteor appearance would increase to storm conditions in 1901 and continue until 1902.

LEONID METEOR SHOWER

1900

Early in the 20th century, the Arlington Time Signal of the [US Naval Observatory](#) in Washington DC was being broadcast to wireless receivers.

Max Karl Planck of [Germany](#) became able to explain the spectrum of radiation emitted from a hot black body, through the introduction of an universal constant which he denominated "the quantum of action." We now know this as Planck's constant. One consequence of this reconceptualization is that the energy of an oscillator can be considered to be merely the sum of a series of small discrete units, each of which has a value that is proportional to the frequency of oscillation.

HISTORY OF OPTICS

ASTRONOMY

ASTRONOMY

May 28, Monday: Boxers destroyed the Feng-tai railroad station and tore up part of the tracks. Foreign ministers in [Peking](#) decided that they needed to ask their fleets to send troops to protect the legations.

Major General George T. Pretymann stood at noon at Bloemfontein and announced that the Orange Free State of South Africa was annexed to the British Empire.

At the Paris Exposition, the Gare d'Orsay opened as the 1st electrified urban rail terminal.

During the morning millions of Americans turned out to observe a total eclipse of the sun in a pathway through the southeastern United States (this was the initial such event since the "Brownie" had become available).



ASTRONOMY

1903

In the US, the invention of machine-drawn cylinder glass (in the United Kingdom, Pilkington Glass would be manufacturing this sort of glass from 1910 to 1933).

GLASS WINDOWS



ASTRONOMY

ASTRONOMY

Percival Lowell insisted that through his telescope he had been able to make out that there were canals on Venus. We now know that he actually did see something: from the sketches he provided, and from his observation records, we can now conclude that he wasn't deluding himself, he actually was seeing something. His telescope had been set up on such a manner that he was able to observe, in what he took to be the face of Venus, reflections of the blood vessels in the retina of his own observing eye.¹⁹⁴

ASTRONOMY

1905

Albert Einstein became able to explain the photoelectric effect on the basis of an assumption that light is a quantized phenomenon, occurring in packets. This was Einstein's *annus mirabilis*, during which he would be authoring pioneering articles not only on the concept of the quantum of light but also on special relativity and on Brownian motion. His quanta of light would subsequently receive the name "photons."

HISTORY OF OPTICS

In [Germany](#), Alfred Ploetz founded the *Gesellschaft fuer Rassenhygiene*.

The high aptitude of the Jews and their outstanding role in the progress of mankind considering men like Jesus, Spinoza, Marx has to be kindly acknowledged without hesitation... All this Antisemitism is a flop which will vanish slowly in the light of scientific knowledge and a humane democracy.

„Die hohe Befähigung der Juden und ihre hervorragende Rolle in dem Entwicklungsprocess der Menschheit muss angesichts der Namen Jesus, Spinoza, Marx ohne Weiteres mit Freude anerkannt werden... Der ganze Antisemitismus ist ein Schlag in's Wasser, dessen Wellenkreise in der Fluth der naturwissenschaftlichen Erkenntniss und der humanen Demokratie langsam vergehen werden.“
(*DIE TÜCHTIGKEIT UNSERER RASSE UND DER SCHUTZ DER SCHWACHEN: EIN VERSUCH ÜBER RASSENHYGIENE UND IHR VERHÄLTNIS ZU DEN HUMANEN IDEALEN, BESONDERS ZUM SOCIALISMUS*, pages 141-2)

EUGENICS

1907

[Alfred Russel Wallace](#) debunked Percival Lowell's conceit that [Mars](#) was inhabited by living beings who irrigated their crops by means of canals, by pointing out among other things that the polar caps of Mars probably consisted of frozen CO₂ rather than of H₂O.

ASTRONOMY

194. In other words, if the man had had the wit to make one of his sketches while looking through his telescope with his head to one side, this whole episode would have been unnecessary — as he would have been able to notice that this rotation of his head rotated also the image that he was perceiving.



ASTRONOMY

ASTRONOMY

1908

Gustav Mie of Germany described the manner in which particles that were not small in comparison with the wavelength of a beam of light would cause that beam to scatter, taking account of particle shape and of the difference in refractive index between the particles and the supporting medium.

January 27: Austrian Foreign Minister Count Alois Aehrenthal announced that a railroad would be constructed from Sarajevo to Thessaloniki, over the Balkans.



British astronomer Philibert Jacques Melotte discovered Pasiphaë, the 8th moon of Jupiter to be observed from Earth.

ASTRONOMY

June 30, Tuesday: A mysterious fireball exploded over Tunguska in Siberia, producing a mushroom cloud, thermal currents that set great tracts of land on fire, and a black rain that would inflict a scabby disease on reindeer. Seismic recorders all over the world took record of this event, but Russian investigators would not be able to struggle over the knocked-down treetrunks and arrive on the boggy site most affected by this [comet](#) or [meteor](#) strike until 1927.



1910

April 20, Wednesday/21, Thursday: Regular as clockwork, the 3d whip around the sun as had been predicted by [Edmond Halley](#) in 1704  of the comet which had been observed by the Reverends Increase Mather and [Cotton Mather](#) through [Harvard College](#)'s "3 foote and a halfe with a concave ey-glasse" reflecting telescope in 1682,  the comet which is known as "P/Halley" to the initiated and as "[Halley's Comet](#)" to the unwashed. It would be during this appearance that it would be possible to calculate in advance the date of its perihelion (the point at which it would come closest to the sun, some 55,000,000 miles, which is not really all that much on target) within a margin of error of three days. It was announced in the popular press that this time the million-kilometer tail of the comet would sweep across Earth's orbit, and a "comet pill" was marketed as an antidote for the comet's poisonous gasses.¹⁹⁵



Halley's Comet is sometimes called "the comet of all lifetimes," or "mankind's comet," because the length of its orbit brings it within sight of the earth about every seventy-five years – the approximate length of one human lifetime. Most people who live to adulthood have the opportunity to view it.

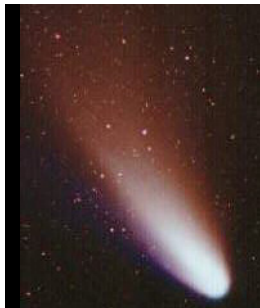
ASTRONOMY

HARVARD OBSERVATORY

Samuel Langhorne Clemens, who had been born in Missouri while the comet was departing in 1835, died on this day during this next passage of the comet. The biologist Sewall Wright witnessed this visit of this comet while working on the railroads in South Dakota, and would endure to mark its disappointing performance upon its well-anticipated next visit in 1985-1986.

On its trip back out into the cold dark the comet would come within 0.15 astronomical units of the earth, and in all probability the earth did pass through its 120-degree tail of gas and dust.

195. This pill would prove to be quite effective, so effective in fact that it would work even for those who neglected to procure it.



HALLEY'S COMET



This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE, 1,057 BCE, 466 BCE, 391 BCE, and 315 BCE, but then on the 240 BCE return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE and again in 87 BCE, and then it was recorded as being seen in 12 BCE, 66 CE, 141 CE, 218 CE, 295 CE, 374 CE, 451 CE, 530 CE, 607 CE, 684 CE, 760 CE (only by Chinese), 837 CE, 912 CE, 989 CE, 1066, 1145, 1222, 1301, 1378, 1456, 1531, 1607, 1682, 1758, 1835, 1910, and 1986 – and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



EDMOND HALLEY

May 10, Saturday: Many people in Rochester, New York were disappointed on this day having been given to understand that they would be able to see [Halley's Comet](#) (the comet would come closest as it passed between Earth and the sun, on the 18th).

ASTRONOMY

May 17, Tuesday: Mme. Haydee Bouyard of Gard noticed that there was, on the shell of one of the eggs she was taking from the nests of her chickens, an image of [Halley's Comet](#).

ASTRONOMY

May 18, Wednesday: As [Halley's Comet](#) made its closest approach to the earth this time, passing between the planet and the sun, many people were believing that its arrival this time heralded the End of the World — some were supposing that cyanide gas in the tail would poison the atmosphere. “Comet pills” were being offered that would render the purchasing population immune to such toxins. In Germany one might purchase a postcard which depicted apocalyptic scenes, captioned “End of the World on May 18” (Weber, Eugen. APOCALYPSES. Cambridge MA: Harvard UP, 1999, page 196-198, Abanes, Richard. END-TIME VISIONS. NY: Four Walls Eight Windows, 1998, page 339).

MILLENNIALISM



ASTRONOMY

ASTRONOMY

May 19, Thursday: Had Earth passed through the tail of [Halley's Comet](#) as its nucleus was passing across the face of the sun? It may well have — but of course the tails of comets are so utterly tenuous that such an event could not be generally noticed. There was public reaction, as in the case of a sheep rancher in California who managed to do a considerable amount of harm to himself by hanging himself upon a cross. One self-promoter again came up with the perennial notion that this [comet](#), having appeared in 12 BCE, equated to the “Star of Bethlehem,” and announced that this time the comet heralded the [Second Coming](#) of Christ Incarnate.

MILLENNIALISM

Elsewhere, a [suicide](#) left a note that he was offing himself so as not to be “killed by a star.” It is probably not true, but mere media hype, that in Oklahoma some cultists were intercepted just short of sacrificing one of their virgins to the comet, but in fact some Wisconsin farmers had temporarily taken down their lightning rods. Miners in Wilkes-Barre, Pennsylvania had refused to enter the mines on the 18th, the day on which it had been announced that Earth was passing through the comet's tail. On the bright side, Luigi Cieface, who was in the hoosgow in Newark on charges of having attempted to blackmail Enrico Caruso, was encouraged by his fear of the comet's tail to confess to a murder and reveal to his interrogators the spot at which he had buried the body (calculations indicate that the tail missed us by maybe less than the distance of the moon, but there were some unconfirmed reports of apparent high noctiluminescent clouds, and of suspicious sky glows).

ASTRONOMY

May 23-24, night: Due to a total [eclipse](#) of the moon, the display of [Halley's Comet](#) in the evening sky was truly to die for. At [Brown University](#) in [Providence, Rhode Island](#), the undergraduates were heard to be cheering wildly (then as now, any excuse for a party).

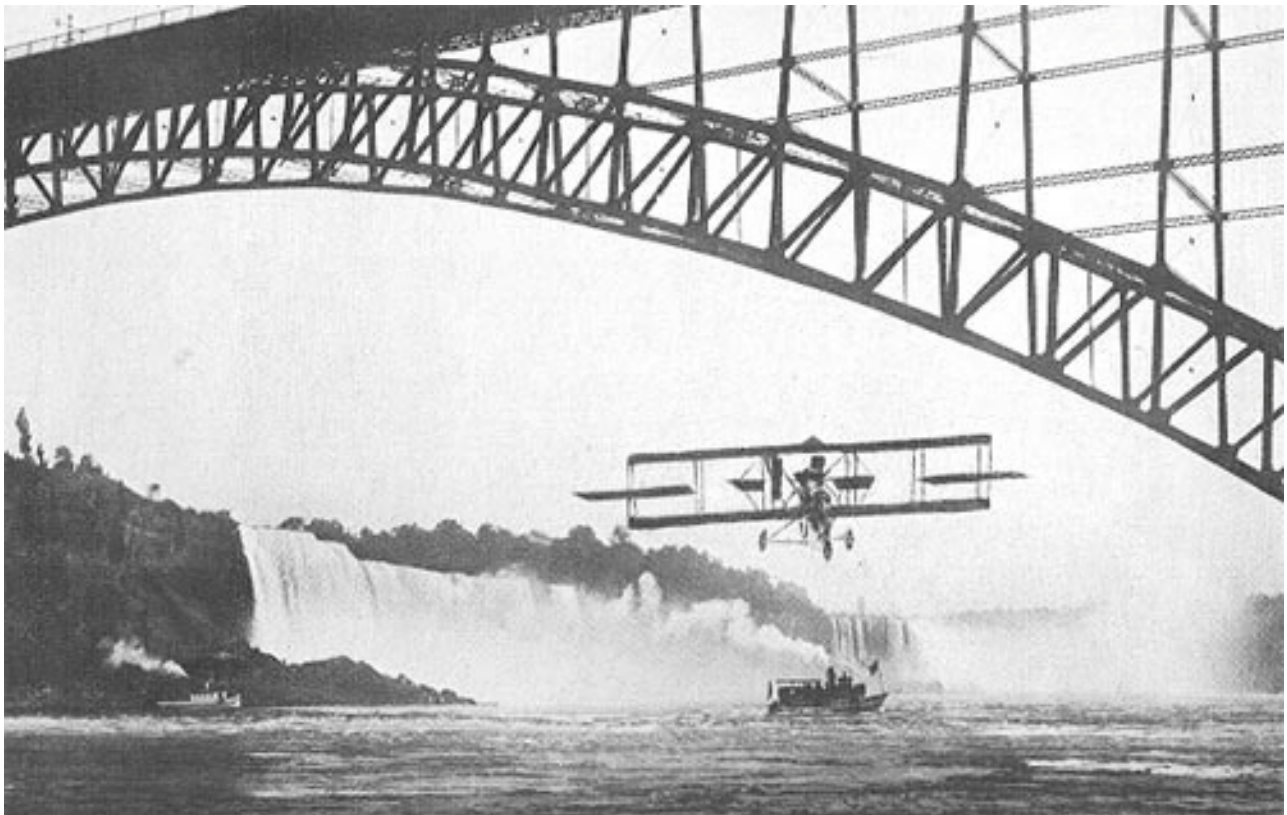
ASTRONOMY

1911

June 28: There has been, so far, only one report of a fatality due to the fall of stones from the sky. It happened on this day when a shower of stones fell on the Nile delta near Alexandria, [Egypt](#), at Nakhla — a stone killed a dog.

ASTRONOMY

At 5:40PM a 2-wing Curtis biplane circled the [Niagara Falls](#) several times with Lincoln Beachy in its open cockpit. He dove into the rising plume of mist above the falls and slipped through the arch of the Falls View Honeymoon Bridge.



Following the river surface at 50 mph within 20 feet of the water the length of the gorge, he'd made his point and didn't attempt to underfly the two railroad bridges.

1913

In Belgium, the 1st flat sheet glass drawn by machine (this sort of glass would be first drawn, in the United Kingdom, in Kent in 1919).

GLASS WINDOWS



1915

William David Coolidge patented a method of making the filaments of electric lightbulbs not out of carbonized cotton but out of tungsten.

1916

Albert Einstein proposed that in addition to the known processes of the absorption of light, and of the spontaneous emission of light, it should be possible to discover a process involving the stimulated emission of light.

HISTORY OF OPTICS

1919

May 29: The [German](#) response to the draft Treaty of Versailles, consisting of 25,000 words, condemned reparations, war guilt, and territorial provisions.

British astronomer Arthur Eddington observed a total eclipse of the sun on the island of Principe. The photographs he took demonstrated Einstein's theory that light was bent by gravity.

Charles Strite invented the popup toaster in Stillwater, Minnesota.

On Principe Island off the west coast of Africa, [Friend](#) Arthur Stanley Eddington observed an eclipse (size = 1.072; duration = 6 minutes and 51 seconds) in order to record the apparent position of stars appearing close to Sol's totally obscured disk. In collaboration with Sir Frank Watson Dyson, he would be able to demonstrate that the rays of light from those stars were being noticeably bent by the sun's gravitational field as they passed near it — bent in a direction and to a degree that had been predicted by Albert Einstein's theory of General Relativity.

HISTORY OF OPTICS

**1920**

[Ezra Pound](#)'s HUGH SELWYN MAUBERLEY.

During this decade, in Paris, [Pound](#) would be editing T.S. Eliot's THE WASTE LAND for publication.

Until this decade, plate glass used for oversized [glass windows](#) had been being produced entirely by the casting method. Workers would pour molten glass onto cast-iron tables from large regenerative pots, then roll, anneal, grind, and polish the resultant slab into a finished sheet. The process had been slow and labor-intensive, therefore plate glass had been expensive. Not surprisingly, it had seen very limited residential use during the 19th Century. In this year, however, continuous ribbon production of sheet plate was begun by the Ford Motor Company.

(One has cause to wonder whether Pound's preparation of Eliot's poetry during this decade was more similar to the old, labor-intensive rolling, grinding, and polishing of plate, or more similar to the new, continuous ribbon production of plate.)

1922

Ford Motor Company engineers had developed a semi-continuous method of rolling plate glass for automobile windshields that would soon be adopted by the Pittsburgh Plate Glass Company and by the Libby-Owens-Ford Glass Company. In result, the price of plate glass would drop to closer to the price of standard window glass, though it would remain somewhat more costly. This more affordable plate glass would contribute to a trend to put picture windows in new homes.

[GLASS WINDOWS](#)**1923**

The 1st United Kingdom production of continuous polished plate glass, using a single-grinding process.

[GLASS WINDOWS](#)**1925**

The Pilkington Brothers developed a continuous grinding and polishing process for ribbons of sheet glass.

[GLASS WINDOWS](#)



ASTRONOMY

ASTRONOMY

1926

The Pilkington Brothers achieved continuous production of ribbons of sheet glass by flowing glass from a tank furnace over a weir, and then onto rollers.

GLASS WINDOWS

1927

Paul Adrien Maurice Dirac of England presented a method of representing the electromagnetic radiation field in quantized form.

HISTORY OF OPTICS

1928

Chandrasekhara Raman of India observed a weak inelastic scattering of light from liquids. We now know this effect arising from the scattering of light by vibrating molecules as “Raman scattering.”

1930s

At about this point, factories for the continuous rolling, grinding and polishing of sheet glass were in operation. By this decade, plate glass 127"x286" could be produced up to 1 1/4" thick. The American Window Glass Company of Pittsburgh offered an alternative to plate glass in oversize windows they were terming “Crystal Sheet,” a special 39-ounce-per-square-foot glass 3/16" in thickness. However, picture windows usually used 1/4", 5/16", or 3/8" plate glass, with for stability larger windows requiring thicker glass.

GLASS WINDOWS



ASTRONOMY

ASTRONOMY

1932

A number of observers independently established that light could be diffracted by ultrasonic waves.

E.H. Land invented “polaroid” polarizing positive photography.

HISTORY OF OPTICS

November: The rate of strikes during the Leonid meteor shower again increased, but the anticipated huge storm was not observed. It seems that bad November¹⁹⁶ weather, bad observation conditions, caused the storm to simply be missed even by the more scientifically oriented observers.

ASTRONOMY

196. By the way, you should bear in mind that although we have come to think of the Leonids as a mid-November phenomenon, during the 16th Century they had been occurring during late October, and back in the 10th Century, they had occurred at mid-October.

1933

May 27: The “Century of Progress” International Exposition opened in [Chicago](#). The theme of the exposition was the progress of civilization during the century of that metropolis’s corporate existence — this would be the 1st time in American history that an international fair would pay for itself. That it would pay for itself, however, seems to have been due rather largely to one person, Sally Rand, who got star billing at the “Streets of Paris” concession for her slow fan gyration wearing only ostrich plumes, performed to the strains of Debussy’s “Clair de Lune.”

Ohiyesa, or Doctor “Charles Alexander Eastman,” universally accepted as a credit to his race, would be awarded a medallion of recognition at this exposition. Indicative of the racism of the times, this medal celebrated “what an Indian could achieve.”



We do not have a record of the physician’s thoughts while this signal honor was being bestowed upon him by the white people who constituted one quartering of his pedigree and by the dominant white culture which constituted some proportion of his heritage. We do hope he had a chance, while he was on the grounds, to stop by the “Streets of Paris” concession and enjoy Sally Rand’s class act.

At this exposition George Fred Keck’s ultra-modern House of Tomorrow and Crystal House emphasized the use of glass throughout the home — the term “picture window” was right around the corner.

GLASS WINDOWS



1934

Frits Zernicke of the Netherlands described how it might be possible to create a phase-contrast microscope.

HISTORY OF OPTICS

The final large telescope was installed at the [US Naval Observatory](#), a 40-incher. This was the 2d and final telescope made by George Ritchey. Unfortunately, there was such light pollution caused by the surrounding metropolis as to severely impair the usefulness of the instrument. Seeking a dark sky, the Observatory would settle upon Flagstaff, Arizona, and relocate the 40-incher to the “Naval Observatory Flagstaff Station.” Operations there would commence in 1955, and in 1964 a 61-incher, the “Kaj Strand Astrometric Reflector,” would be added there.

1935

A solar-home innovator, George Fred Keck, introduced thermal pane windows (thermal pane picture windows would not be commonly found on all classes of residential construction until the 1960s).

GLASS WINDOWS

1937

In factories for the production of sheet glass, both sides of the glass ribbon came to be ground and polished simultaneously.

GLASS WINDOWS

1938

Pilkington Glass developed the twin ground polished plate system.

GLASS WINDOWS

1939

Walter Geffcken of Germany described how it might be possible to create a transmission interference filter.



1941

W.C. Anderson used a Kerr cell to modulate a light beam that passed through a Michelson interferometer, to measure the speed of light, obtaining a value of 299,776 kilometers/second⁻¹ that was slightly lower than the value of 299,796 kilometers/second⁻¹ that had been measured by A.A. Michelson in 1926.

HISTORY OF OPTICS

1944

Thomas Hovenden painted the “Last Moments of John Brown” based upon the newspaper account designed to disgust, which had alleged that the condemned traitor and murderer John Brown had sunk so far into depravity that while on his way to the scaffold he had paused and kissed a black child. In this painting the myth originally designed to disgust and alienate the newspaper readers has become a PC myth designed to delight. The child reaches to grasp a hempen noose already placed loosely about the condemned man’s neck.

Sunspots

Min /Max
1901 -1905
1913 -1917
1924 -1928
1933 -1938
1944 -1948
1954 -1958
1965 -1970
1976 -1980
1986 -1989
199? -19??





ASTRONOMY

ASTRONOMY

1945

H.H. Nininger elaborated on the prospects of our sending up one of our new [atomic bomb](#) things, to blow samples of the lunar surface in the direction of the Earth — where they could be evaluated in the manner in which we examine meteorites.

ASTRONOMY

1948

Dennis Gabor described principles of wavefront reconstruction that later would become the basis for holography.

1954

November 30: Mrs. Hewlett Hodges of Sylacauga, Alabama reported being severely bruised when an 8-pound stony meteorite crashed through her roof. If this was an accurate report, hers is the 1st known human injury as the result of a meteor strike — ever.

ASTRONOMY

1956

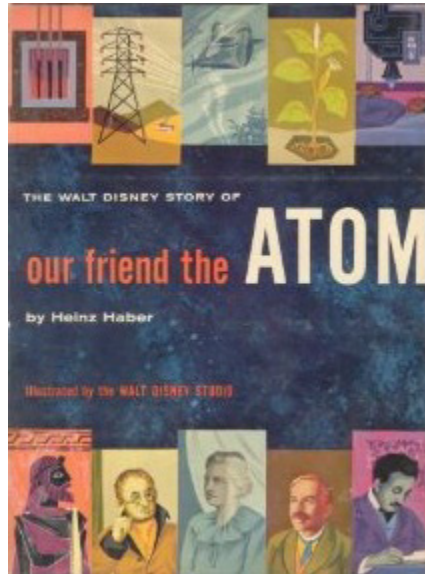
[Robinson Jeffers](#) made his final trip to Ireland, while Merle Armitage and the Ward Ritchie Press were publishing his THE LOVING SHEPHERDESS with illustrations by Jean Kellogg.

RAND Corporation began a study of detonating [atomic bombs](#) on the moon.

ASTRONOMY

1957

The initial [nuclear-powered](#) surface ship, the *Lenin*, an icebreaker.



An Atlas rocket scientist, Kraft Ehrlicke, and Nobel-winner George Gamow, proposed a rocket –to be named “Cow” after that nursery rhyme– that would loop past the Moon and return to Earth. Cow would be preceded by a rocket carrying an [atomic bomb](#) that would explode on the moon and raise a cloud of vaporized rock. The Cow rocket would fly through the cloud and thus return lunar surface samples to Earth.

ASTRONOMY

The US congress provided the electric utilities with abundant motivation for indulging in [atomic power](#), by means of a Price-Anderson Act that affirmed a preposterously low \$65,000,000 cap on liabilities to the general public for a major accident (estimates at the time were that such a major nuclear incident might cost the nation more than \$650,000,000), and in effect created a government-run [nuclear insurance](#) pool.

October: Fire destroyed the core of a reactor at Britain’s [Windscale nuclear complex](#), sending clouds of radioactivity into the atmosphere, and for sure everybody hoped nothing like that would ever happen again.¹⁹⁷

The Jet Propulsion Laboratory proposed that we out-Sputnik the Russkis with a lunar program they called “Red Socks,” that would set off an [atomic bomb](#) on the surface of the moon, not only to collect samples of lunar rock as meteorites, but also, JPL’s director Pickering was quick to point out, to create “beneficial psychological results.” Shock and awe, folks, shock and awe. Moon dust. Terrorism. Terrorists ’R Us.

¹⁹⁷. For many years it would be considered impolite to make reference to this unfortunate affair — it would become the elephant in many a classroom. It was just an accident.



1958

Arthur L. Schawlow and Charles H. Townes proposed that the maser principle of microwave radiation could be extended into the visible region of the spectrum. Doing this would produce what would come to be termed the “laser.”

1959

90% of the world’s flat glass was being produced by the float glass process invented earlier in the decade of the 1950s by Sir Alastair Pilkington of Pilkington Brothers. In this process molten glass was poured onto one end of a molten tin bath. The glass would float atop the tin, leveling out as it spread along the bath until it achieved a smooth face on both top and bottom. The glass would cool and slowly solidify as it traveled over the molten tin and then be lifted off the surface of molten tin as a continuous ribbon. The glass was then fire-polished, the finished product having near-parallel surfaces. Glass was being produced in standard metric thicknesses of 2, 3, 4, 5, 6, 8, 10, 12, 15, 19 and 22 mm. In this year this float glass was launched on the United Kingdom market.

GLASS WINDOWS

1960

Theodore H. Maiman described the 1st laser, which he had created at the Hughes Research Laboratories in Malibu, California using as the lasing medium a rod of synthetic ruby.

HISTORY OF OPTICS

A few months later Donald Herriott, Ali Javan, and William Bennett of New Jersey’s Bell Laboratories unveiled the first helium-neon lasers, of the type we now see at the supermarket checkout.

1961

Threnody for the Victims of [Hiroshima](#) for 52 strings by Krzysztof Penderecki was performed live for the first time, in Warsaw. It was broadcast over the airwaves of Radio Warsaw.



ASTRONOMY

ASTRONOMY

General Electric's SNAP small [nuclear reactors](#) began to be included in our space satellites. –I'm just saying, if it's small it's not that dangerous, right?

The beginning of the "Operation Plowshare" program to use [nuclear explosions](#) as part of massive construction projects. For instance, a chain of explosions across Nicaragua might be able to dig a "Pan-Atomic Canal," a sort of supersized Panama Canal all at ocean level. To move all that dirt, loft it into the sky where it will do no harm. If only there were no such thing as radiation damage, this might seem like a good idea, an engineering feat one might attempt. (If only.)

Bell Laboratories introduced the first high-energy gas laser. High-energy gas lasers can drill holes through solid steel at nearly light speed, and this would cause industrialized nations to spend billions of dollars researching direct-fire laser weapons. Unfortunately, such weapons would turn out to require batteries storing several megawatts of energy, and those are not especially portable. (By way of comparison, the most powerful turbine at Washington State's Grand Coulee Dam generates 815 megawatts, while the most powerful nuclear reactors in the world, including the Ignalina reactor in Lithuania and the CHOOZ-B1 reactor in France, generate around 1.4 megawatts.) The Bell Laboratories gas laser employed a mixture of helium and neon as a lasing medium, its most intense beam being generated at a wavelength of 1.153 μm in the near infrared spectrum.

HISTORY OF OPTICS

By passing the pulse from a ruby laser through a quartz crystal, it became possible in this year to demonstrate the generation of harmonics in light.

1962

Observation of stimulated emission from homojunction gallium arsenide semiconductor diodes.

HISTORY OF OPTICS

1963

Kumar Patel of Bell Laboratories announced the development of the 1st carbon dioxide laser.


**1964**

William B. Bridges of Hughes Research Laboratories produced an ion laser.

Jerome V.V. Kasper and George C. Pimentel of the University of California–Berkeley created a new type of laser in which photodissociation of CF_3I or of CH_3I produced a population inversion in atomic iodine. The lased output of this new chemistry turned out to be at a wavelength of 1.315 μm in the near infrared spectrum.

1965

Lost for nearly a century, [P/Tempel-Tuttle](#) was rediscovered. Calculations would later reveal that this [comet](#) had passed closer to Earth's orbit (0.0032 astronomical units) than on any occasion since 1833.

It is hypothesized by Brian Marsden that the great sungrazer [Ikeya-Seki](#) of this year originated as part of the great [sungrazing comet](#) of the year 1106 CE,  which in turn had originated as one of the two pieces of one great parent sungrazer that had whipped around the sun splitting into two sometime between 18,000 BCE and 8,000 BCE.

ASTRONOMY

1966

Peter Sorokin and J.R. Lankard created the 1st organic dye laser.

HISTORY OF OPTICS

November 17: A tremendous storm of tens of thousands of Leonid [meteors](#) fell for a short interval timed by skywatchers in the central and western United States. This display probably rivaled the historic meteor storms of 1799 and 1833. Within just a couple of hours, observed rates increased from about 40 per hour to as many as 40 per second: “We saw a rain of meteors turn into a hail of meteors too numerous to count,” reported Charles Capen from the San Gabriel Mountains of Southern California. “The meteors were so intense that we were guessing how many could be seen in a one-second sweep of the observers head... A rate of about 150,000 per hour was seen for about 20 minutes,” reported Dennis Milon from Kitt Peak in Southern Arizona.

ASTRONOMY



ASTRONOMY

ASTRONOMY

1971

John M.J. Madey outlined the principles of the free electron laser.

1974

September 14: American astronomer Charles T. Kowal discovered Leda, the thirteenth moon of Jupiter to be observed from Earth, from three nights of photographs (Sept. 11-13) taken at Mount Palomar Observatory, California.

ASTRONOMY

1976

John M.J. Madey and a group at Stanford University demonstrated the 1st free-electron laser.

1977

Mary I. Kaiser's "Conversing with the Sky": The Imagery of Celestial Bodies in Thoreau's Poetry" appeared in the Thoreau Journal Quarterly, Volume 9, pages 15-28.

ASTRONOMY

March 10, day: A service of thanksgiving for the life and work of Benjamin Britten was held in Westminster Abbey.

Diotima for orchestra by John Harbison was performed for the first time, in Boston.

US astronomer James Elliot and his colleagues, working with the Kuiper Airborne Observatory, discovered the rings of Uranus.

ASTRONOMY



1978

June 22: Bulgarian authorities arrested four West German terrorists and flew them to West Germany. This was the 1st time a Soviet satellite has returned suspected terrorists to the west.

American astronomer James Christy discovered Charon, the only known moon of Pluto, from the [US Naval Observatory](#) in Washington.

ASTRONOMY

July 7: The Solomon Islands, under Queen Elizabeth II and Prime Minister Peter Kenilorea, were proclaimed independent of Great Britain.

The announcement of the discovery of Charon on June 22d was made by the [US Naval Observatory](#), Washington.

ASTRONOMY

1980

Colin Keay of the University of Newcastle in Australia hypothesized that [meteors](#) which appear to be causing a corresponding synchronous noise at ground level were actually emitting some sort of radio wave as they passed through the upper atmosphere, and that this radio wave was traveling at nearly the speed of light, and was reaching the ground and acting upon ordinary objects near the observer. These ordinary objects at ground level, such as strips of paper, metal foil, eyeglasses, pine needles, blades of grass, etc. were sometimes acting as transducers, and converting the energy of these radio waves into whispery acoustic waves.

March 1: Soviet forces launched a major offensive in Kunar province, routing the Afghan rebels.



The UN Security Council voted to call on Israel to dismantle its West Bank settlements.

The Cry of Clytemnestra, an opera by John C. Eaton to words of Creagh after Aeschylus, was performed for the first time, in Bloomington, Indiana.

French astronomers Pierre Laques and Jean Lecacheux discovered Helene, a moon of Saturn, from the Pic du Midi Observatory.



ASTRONOMY

1982




































April: The Lyrid meteor shower, which is the earliest such meteor shower of which we still have any record, appearing on the record in April 687 BCE,  was again most prominent, averaging up to 75 streaks per hour. [Thatcher comet](#), one of the two which appeared in 1861,  is possibly the parent of this Lyrid shower.

SKY EVENT

1985

Regular as clockwork, the 4th return as had been predicted by [Edmond Halley](#) in 1704  of the comet which had been observed by the Reverends Increase Mather and [Cotton Mather](#) through [Harvard College](#)'s "3 foote and a halfe with a concave ey-glasse" reflecting telescope in 1682,  the comet which is known as "Halley's" to commoners and as "P/Halley" to others. It would be during this appearance of [Halley's Comet](#) that it would attract visitors: it would be met by two Vega and one Giotto spacecraft, from the USSR and from Europe, which would pass near its head and take many photographs.

ASTRONOMY

This is what Halley's Comet looked like, the last time it passed us. We have records of the appearances of this comet on each and every one of its past 30 orbits, which is to say, we have spotty records of observations before that, in 1,404 BCE,  1,057 BCE,  466 BCE,  391 BCE,  and 315 BCE,  but then on the 240 BCE  return the sightings record begins to be complete. The Babylonians recorded seeing it in 164 BCE  and again in 87 BCE,  and then it was recorded as being seen in 12 BCE,  66 CE,  141 CE,  218 CE,  295 CE,  374 CE,  451 CE,  530 CE,  607 CE,  684 CE,  760 CE (only by Chinese),  837 CE,  912 CE,  989 CE,  1066,  1145,  1222,  1301,  1378,  1456,  1531,  1607,  1682,  1758,  1835,  1910,  and 1986  - and we are confidently awaiting sightings in 2061 and 2134 even though due to a close conjunction with the earth we are presently unable to calculate what orbit it will have by the date of that approach. Each time P/Halley orbits in out of the Kuiper belt beyond the planets Neptune and Pluto and whips around the sun, it has been throwing off about one 10,000ths of its mass into a streaming tail, which means that this comet which we know to have been visiting us for at the very least the past 3,000 years or so is only going to be visiting us for perhaps another half a million years or so!



HALLEY'S COMET



EDMOND HALLEY

1986

Michael J. Crowe's THE EXTRATERRESTRIAL LIFE DEBATE 1750-1900: THE IDEA OF A PLURALITY OF WORLDS FROM KANT TO LOWELL (Cambridge MA: Cambridge UP, especially page 237).

1987

April 29, Wednesday: Leland Jensen of the Bahá'is Under the Provisions of the Covenant had been predicting that [Halley's Comet](#) was going to be pulled into Earth's orbit, with chunks of the comet pelting the Earth for a year. The gravitational force of the [comet](#) would be causing great earthquakes and on this day the main body of the comet was scheduled collide with the planet Earth. Soon Jensen would be proclaiming that "A spiritual stone hit the earth." (Robbins, Thomas et al. MILLENNIUM, MESSIAHS AND MAYHEM. NY: Routledge, 1997, page 73, 78)

HERE COME DA JUDGE!

ASTRONOMY




1990

April 25: The Hubble space telescope was inserted into low Earth orbit. Like the original Galilean telescope, it had a design flaw that made the images fuzzy.¹⁹⁸

198. "Get it right the first time" is a better motto for theology than for cosmology.



1992

September 26, Saturday: [Comet Swift-Tuttle](#) was noted to have returned. As it passed the great globular cluster M13, it would outshine this lump of stars. This visit confirmed the hypothesis that the [comet](#) observed by Father Ignatius Kegler in [China](#) in 1737  had indeed been an earlier visit of Swift-Tuttle. This visit also produced a calculation, later found to be imprecise, that there was a small possibility that on its next visit, in 2126, it would collide with Earth.

ASTRONOMY

Comet Swift-Tuttle, not a small body at all, and with a potential impact speed of 60 kilometers per second, and with a generally intersecting trajectory, repeatedly whipping by us, has been described as the single most dangerous object known to humankind — somewhat more deadly even than your proverbial speeding bullet.

1994

July 25, Monday: Astronomer Brian Marsden had discovered that [Comet Shoemaker-Levy 9](#) would collide with Jupiter on July 16, 1994. Sister Marie Gabriel Paprocski then announced that another [comet](#) was going to collide with Jupiter on or before this day, and that this one would cause the “biggest cosmic explosion in the history of mankind” and bring on the End of the World. The event predicted by Marsden did occur while the event predicted by Paprocski did not (Skinner, Stephen. *MILLENNIUM PROPHECIES*. Stamford CT: Longmeadow Press, 1994, page 116, Levy, David M. *COMETS: CREATORS AND DESTROYERS*. NY: Touchstone, 1998, page 207).

MILLENNIALISM

ASTRONOMY

November 18, Friday: The first increase of Leonid meteor shower rates was reported, presaging the return of [comet P/Tempel-Tuttle](#). On this year, the annual Leonid shower was as strong as the Perseids had been in August. The outburst lasted a little over a day and was rich in bright meteors.

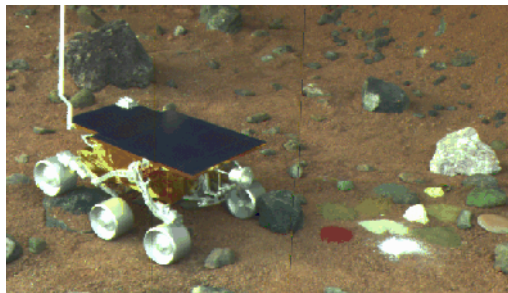
During this year it would be confirmed that comet observations made in the years 69 BCE and 188 CE had definitely been observations of earlier returns of the comet P/Tempel-Tuttle. It was also calculated that, although there apparently are no preserved records of sightings in the years 574 BCE and 447 BCE, the comet had indeed visited our solar system during those years.

ASTRONOMY

1995

The Odyssey command module for the Apollo-13 mission, with its scorched heatshield, became part of an exhibit at the Kansas Cosmosphere Space Center in Hutchinson KA. “Toto, I don’t think this is Paris anymore.”

The microrover device of the Mars explorer was designated the “Sojourner,” to honor the 19th-Century perigrinations of Sojourner Truth:



Observations of the Leonids confirmed the newly enhanced rates.

ASTRONOMY

1996

Observations of the Leonids again confirmed the newly enhanced rates.

ASTRONOMY

1997

March 10, Monday: [Comet P/Tempel-Tuttle](#) was finally recovered due to a more accurate calculation of its orbit, and was anticipated to pass perihelion on February 28, 1998.

ASTRONOMY

ASTRONOMY

ASTRONOMY

March 23, Sunday: Richard Michael Schiller, posting under the name Eliyehowa and a host of other pseudonyms, had been warning on the internet that an asteroid was trailing behind Comet Hale-Bopp and would bring destruction to planet Earth on this date. As this day of asteroid impact drew near he had begun to soften this, indicating that actually our planet was not going to be destroyed until 9 months later, when this comet's tail would pass across the Earth.

HERE COME DA JUDGE!

ASTRONOMY

March 24, Monday-26, Wednesday: The Heaven's Gate suicides occurred during the period in which the cultists had predicted a UFO trailing behind Comet Hale-Bopp¹⁹⁹ would be available to pick up their souls and carry them away from the imminent Apocalypse of the planet Earth. We notice a similarity between this and Richard Michael Schiller's prophesy of an asteroid impact on March 23, 1997. Both claims involved that an object was masked from our view behind the comet. This rumor had begun to make the rounds when amateur astronomer Chuck Shramek had mistaken a star for what he initially took to be a "Saturn-like object" following the comet. With the help of the Internet and the Art Bell show, the news that a UFO or asteroid was trailing the comet had spread wildly (Alnor, William M. UFO CULTS AND THE NEW MILLENNIUM. Grand Rapids MI: Baker Books, 1998, page 13, 38).

MILLENNIALISM

ASTRONOMY



"I would not run round a corner
to see the world blow up."
— Henry Thoreau,
"LIFE WITHOUT PRINCIPLE"



May 5: On this date our solar system was anticipated to enter something termed the Photon Belt. Once in this field, something was bound to happen to us. Maybe the world was going to end, maybe aliens would land, maybe humankind would become enlightened or acquire superpowers — or maybe all electrical equipment would cease to work.

MILLENNIALISM

ASTRONOMY

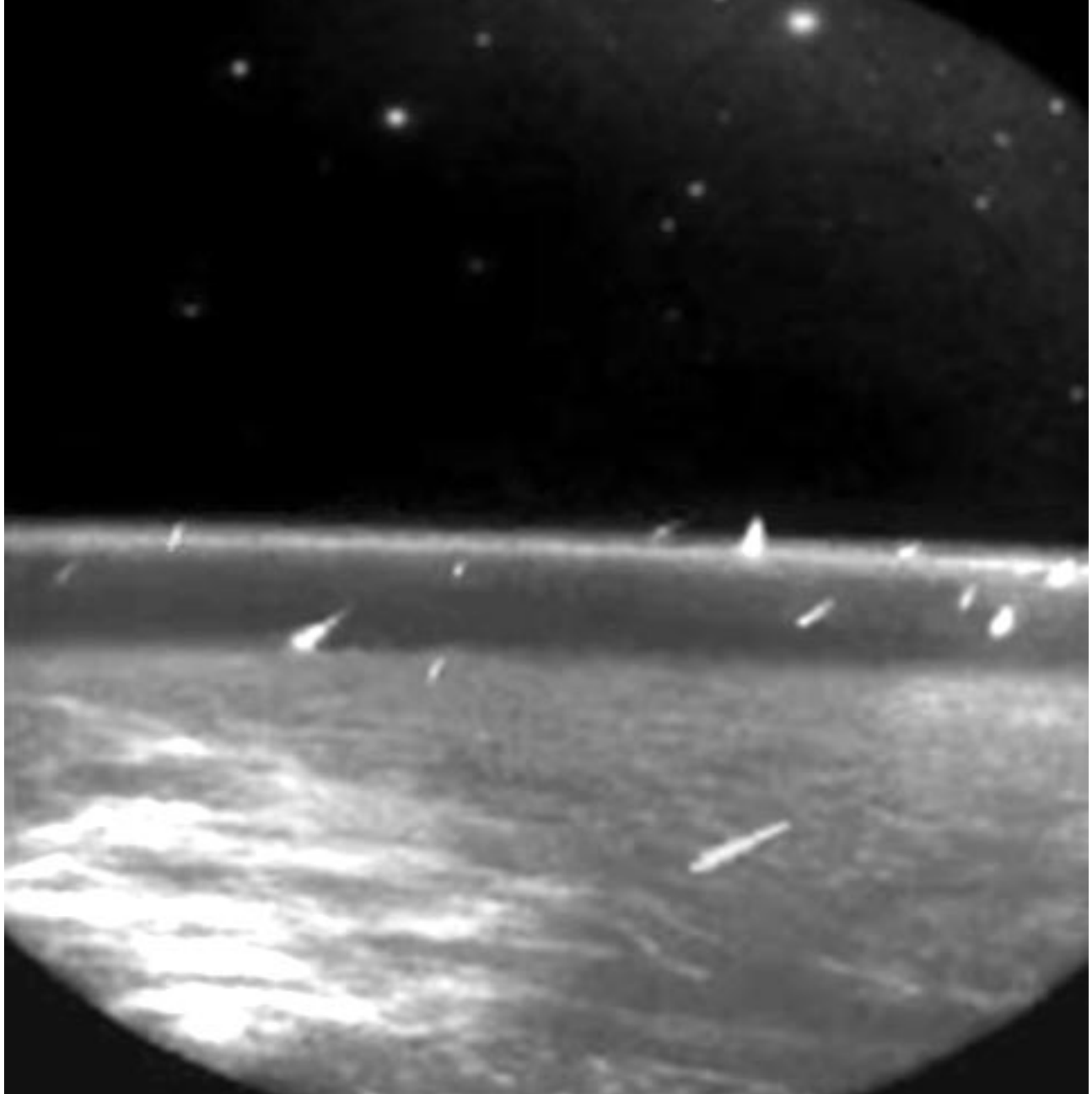
199. This Hale-Bopp comet had last visited the solar system in 2,217 BCE.



ASTRONOMY

ASTRONOMY

November 17: Muslims gunned down 60 visitors and injured 24 at the Luxor, [Egypt](#) tourist site. Then there was a 2-hour police action, and none of the 6 gunmen would be alive to view the Leonid meteor shower of that evening. The peak of the shower is depicted here in a 48-minute exposure made by the MSX satellite:



You can see that during the exposure, 29 meteors were entering the atmosphere on roughly parallel paths (entry angle will of course increase slightly during such a time exposure). Because meteor shower particles travel in parallel paths at the same velocity, they appear from below to radiate from a single point in the sky. The various showers are named for the constellations in which their radiant appears to lie, thus, the Perseids appear to radiate from the constellation Perseus, peaking each year about August 12th, while the Leonids appear to radiate from the constellation Leo, peaking each year about November 17th.

ASTRONOMY

**1998**

This year scientists had predicted a rate of 20-40 meteors per hour across North America during the annual Leonid meteor shower, and allowed that the storm probably would be much more intense than that in other regions of the earth. Actually, the shower did not live up to these expectations.

ASTRONOMY

Finally it became plausible to test the hypothesis that Colin Keay had advanced in 1980, that the reports of singing [meteors](#) were accurate, that some meteors as they passed through the upper atmosphere were generating a radio wave which, when it almost instantly reached the ground, was being transduced into audible noise by ordinary objects lying around, such as strips of paper, metal foil, eyeglasses, pine needles, blades of grass, etc. A team of Swiss scientists in Mongolia managed to make controlled, scientifically recorded observations of this noise as generated by meteors. They found the sounds to be occurring at about 250 Hz. They were able to make recordings!

1999

August 11: During the week between August 11th and August 18th a series of astronomical events were scheduled: on this day there would occur the last total solar [eclipse](#) of the [millennium](#), on the following night the annual Perseid meteor shower would star, on the 17th and 18th NASA's [Plutonium](#)-bearing Cassini space probe would swing around the earth, on the 18th there would be the Grand Cross planetary formation — and meanwhile, the comet Lee would be touring the inner solar system. If you factor into this the Julian calendar used by astrological forecasters, within which frame of reference some of these events are taking place prior to the end of the month of July, you can stir up quite a bit of apocalyptic paranoia. Some were expecting that a previously unknown asteroid or comet would become visible during the eclipse, and would then strike the Earth. The clothing designer Paco Rabanne, on the basis of his incredibly prescient understanding of human attire, was able to infer that on this day the Mir satellite was going to crash into Paris.

HERE COME DA JUDGE!

ASTRONOMY

August 11-14: Escape666.com's original proclamation on its website was to the effect that a doomsday comet was going to strike the planet Earth on some date between the 11th and the 14th (McIver, Tom. THE END OF THE WORLD: AN ANNOTATED BIBLIOGRAPHY. Jefferson NC: McFarlane & Co., 1999 #3362).

MILLENNIALISM

August 18: The End of the World as foreseen by Charles Criswell King (AKA "The Amazing Criswell") in his 1968 bestseller CRISWELL PREDICTS: FROM NOW TO THE YEAR 2000. He had written that:

The world as we know it will cease to exist ... on August 18, 1999.... And if you and I meet each other on the street that fateful day ... and we chat about what we will do on the morrow,

we will open our mouths to speak and no words will come out, for we have no future.

Why August 18? –Uh, because it was Criswell’s birthday? (Abanes, Richard. END-TIME VISIONS. NY: Four Walls Eight Windows, 1998, page 43)

MILLENNIALISM

Many had been fearful that the Cassini space probe, with a load of [Plutonium](#), would crash into the Earth as it whipped by on August 18th. Some went so far as to point out that this amount of plutonium, if vaporized in the atmosphere would poison a third of the world’s population, thus fulfilling the prophecy of REVELATION 8:11 concerning a star named Wormwood — supposedly a metaphor for radiation poisoning (“Chernobylnik” is the Ukrainian word for a purple-stemmed subspecies of the wormwood plant).

HERE COME DA JUDGE!

But, big surprise, Cassini passed by the upper reaches of Earth’s atmosphere, its load of [Plutonium](#) intact, without a hitch.

August 24: In 1996, Valerie James had written in [The European Magazine](#) that “The configuration of planets which predicted the coming of Christ will once again appear on August 24, 1999.” Since actually there isn’t any such configuration of planets predicting the birth of Jesus to be found anywhere in the Christian documentary sources, for sure this nice lady has her head up her ass big time. We may presume, however, that she would have been penciling in this date in her desktop Day Planner, for the [Parousia](#): “August 24th, I’m going to be taken up into Heaven today (cancel all appointments).”





ASTRONOMY

ASTRONOMY

September 23, Thursday: Stefan Paulus had combined information out of Nostradamus with information out of the Bible and with astrology and had arrived at this date as the date upon which a doomsday [comet](#) was going to destroy the planet Earth (Paulus, Stefan. NOSTRADAMUS 1999. St. Paul MN: Llewellyn Publications, 1996, page 57).

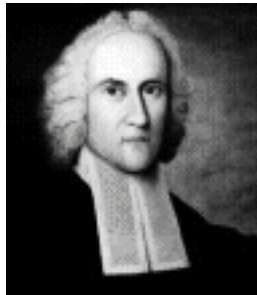
HERE COME DA JUDGE!

ASTRONOMY

2000

Round numbers really do get people going, don't they?

- One of the earliest predictions for events of this year had been made by Petrus Olivi, who wrote in 1297 CE that the [Antichrist](#) was going to come to power between 1300 CE and 1340 CE, with the [Last Judgment](#) taking place around 2000 (Weber, Eugen. APOCALYPSES. Cambridge MA: Harvard UP, 1999, page 54).
- The Reverend [Jonathan Edwards](#) suspected that Christ's thousand-year reign was going to begin in 2000 (Weber, *sic*, page 171).



- The Reverend [Timothy Dwight](#), President of Yale University, cautiously anticipated only that the Year of Our Lord 2000 would mark "the beginning of the new [millennium](#)." (Kyle, Richard. THE LAST DAYS ARE HERE AGAIN. Grand Rapids: Baker Books, 1998, page 81)



ASTRONOMY

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- Sir [Isaac Newton](#), in OBSERVATIONS UPON THE PROPHECIES OF DANIEL, AND THE APOCALYPSE OF ST. JOHN, predicted that Christ's Millennium was going to begin in the year 2000 (later he would revise this estimate until after the year 2060).



- A radical apocalyptic sect, the Convulsionaries, had emerged in early 18th-Century France. One of the members of this sect, Jacques-Joseph Duguet, had anticipated that the [Parousia](#) would arrive in the Year of Our Lord 2000. (Kyle, *sic*, page 192)



- In the 19th Century the founder of Theosophy, Helena Petrova Blavatsky, had suspected that the year 2000 would bring the End Times (Shaw, Eva. EVE OF DESTRUCTION. Los Angeles CA: Lowell House, 1995, page 83).
- Edgar Cayce predicted the [Second Coming](#) of Christ in 2000, followed by a New Age (Hanna, Nick. THE MILLENNIUM: A ROUGH GUIDE TO THE YEAR 2000. London: Rough Guides, 1998, page 219).
- Hal Lindsey, with his failed 1988 prediction behind him, suggested in PLANET EARTH – 2000 A.D. (Palos Verdes CA: Western Front, 1994, page 306) that “[The Rapture](#) may not occur between now and the year 2000.”
- The year 2000 would be the beginning of Christ's [millennium](#), according to the Mormon publication WATCH AND BE READY: PREPARING FOR THE [SECOND COMING](#) OF THE LORD. The New Jerusalem would come to Earth in 2000, descending from the heavens above Independence, Missouri (McIver, Tom. THE END OF THE WORLD: AN ANNOTATED BIBLIOGRAPHY.



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Jefferson NC: McFarlane & Co., 1999 #3377; Skinner, Stephen. MILLENNIUM PROPHECIES. Stamford CT: Longmeadow Press, 1994, page 100).

- Ruth Montgomery has predicted that the planet Earth's axis would shift in 2000 and the [Antichrist](#) reveal himself (Kyle, *sic*, pages 156, 195).
- The Reverend Sun Myung Moon predicted that in 2000 the Kingdom of Heaven would establish itself on Earth (Kyle, *sic*, page 148).
- Ed Dobson's THE END: WHY JESUS COULD RETURN BY A.D. 2000 predicted the [Second Coming](#) of Christ.
- Lester Sumrall in I PREDICT 2000 had predicted the end of the world (Abanes, Richard. END-TIME VISIONS. NY: Four Walls Eight Windows, 1998, page 99, 341).
- The Tribulation was to occur prior to this year, according to the founder of the Christ for the Nations Ministry, Gordon Lindsay (Abanes, *sic*, page 280).
- Texe Marrs had felt certain that the Last Days could "wrap up by the year 2000" (Abanes, *sic*, page 311).
- According to a series of lectures given by Shoko Asahara in 1992, 90% of the world's population were to have been annihilated by nuclear, biological, and chemical weapons by this point in time (Thompson, Damian. THE END OF TIME. Hanover NH: UP of New England, 1996, page 262).
- According to Sun Bear, who portrays himself as a Native American spokesperson, the end of the world would come in this year unless human beings turned over a new leaf (Abanes, *sic*, page 307).
- According to Bhagwan Shree Rajneesh, the world would be devastated by AIDS in this year. The world would, however, then be rebuilt as a peaceful matriarchal society (Robbins, Thomas et al. MILLENNIUM, MESSIAHS AND MAYHEM. NY: Routledge, 1997, page 164).
- William Kamm, AKA "Little Pebble," leader of the Australian doomsday cult "Order of St. Charbel," had predicted that a [comet](#) would already have destroyed planet Earth before the beginning of this new millennium.

ASTRONOMY

- Before the end of 1999, Hon-Ming Chen of the 30-member cult Chen Tao had begun to backpedal on his prediction that a nuclear holocaust and UFO rescue would occur by December 31. Then, according to cult spokesman Richard Liu, he rescheduled Doomsday to "the next year" (St. Cloud Times, December 26, 1999).

HERE COME DA JUDGE!

ASTRONOMY

ASTRONOMY

- According to the ABC News, a Japanese cult, Sukyo Mahikari, had taught that the world might be destroyed by this point in a “baptism of fire.”



MILLENNIALISM

ASTRONOMY



"I would not run round a corner
to see the world blow up."
— [Henry Thoreau](#),
"LIFE WITHOUT PRINCIPLE"



2001

November 18: The Leonid meteor shower was spectacular.
There is not another such shower anticipated for another 36 more years.

ASTRONOMY

The Boston Globe reported that the manuscript of Thoreau's poem "The Just Made Perfect," which he wrote in 1843 on two sheets of paper, had recently been auctioned for a spectacular price of \$27,600.

2003

November 4: The most powerful flare observed by satellite instrumentation began in region #486 of the [sun](#) at 19:29 UTC, and for 11 minutes our instruments were so saturated in radiation as to be unable to measure peak volumes. We estimate that the X-ray flux may have reached X28. Holographic and visual observations indicated that this significant [sunspot](#) activity continued on the far side of the sun.

SKY EVENT



ASTRONOMY

ASTRONOMY

2008

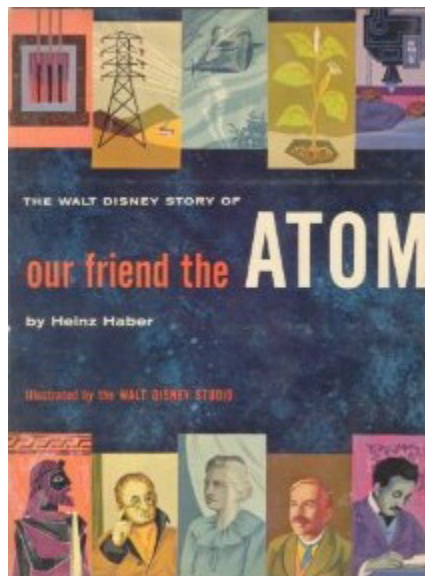
January 9: For the 1st time we have observed a supernova just as it was happening. Having already been alerted by some preliminary X-ray pulses our telescopes were ready and waiting, this time, for the sudden intense pulse of light. We had even, only three hours prior to the flash, taken a photograph of the ordinary appearance of this star with an optical light telescope! This event of course originated long, long ago in a galaxy far, far away (NGC2770) and was just at this point passing through our local solar system after a journey across the empty space between galaxies requiring some 88,000,000 years. The star before it self-destructed seems to have been some 20 times as massive as our Sol. The pulse of radiation measured as 100,000,000,000 times (that's a hundred b-as-in-billion times) more bright than our sun.

SUPERNOVA

In case you weren't aware, every atom of gold in the crust of this planet is the result of such supernovas.

2011

Speaking of a “[nuclear renaissance](#),” President Barak Obama called for federal loan guarantees in the amount of some \$36,000,000,000 (billion with a b), to be used in “building a new generation of safe, clean nuclear power plants.” Hitch your wagon to a star, folks, for this will not be the end of the world as we know it — this new generation of safe, clean nuclear power plants is of course to be far superior to the previous generation of safe, clean nuclear power plants none of which our utility industry had dared to fund since my employment in the industry began in the early 1970s, because now we are quite a bit older and wiser (not to mention, just a bit more desperate).



The Obama administration has rejected the notion that we create a safe repository for spent [nuclear fuel pellets](#) at Yucca Mountain, deciding that instead we should continue to keep the spent fuel rods cool underwater in containment pools yards away from the reactor cores, as we presently do in the 24 GE Mark I reactors that are producing electricity in the United States (that’s the way it is being done in Japan and they aren’t having any problems). What could go wrong?

In related news from the occult front, our solar system is anticipated (by some) to be entering something they term the Photon Belt. Once in this field, something is bound to happen to us! It is time to begin to hyperventilate now. Maybe the world is going to end, maybe aliens will land, maybe humankind will become enlightened or acquire superpowers — or maybe all electrical equipment will cease to function.

MILLENNIALISM

ASTRONOMY

2061

July 28: [Halley’s Comet](#) will whip around the [sun](#).

SKY EVENT

COMETS



March 17: [Halley's Comet](#) will whip around the [sun](#).

SKY EVENT

COMETS

- Harvard Observatory on a hill north of the Cambridge campus, as viewed from the corner of Concord Avenue and Bond Street, illustrated in Gleason's Pictorial Drawing-Room Companion in 1851
[HarvardObservatory.tiff]
- Photograph of the B. Martin telescope, donated by Thomas Hancock to Harvard College in 1761 but evidently confiscated by the British during the Revolutionary War because now in the Science Museum of South Kensington, London, England [ThomasHancockTelescope.tiff]
- Painting of William Cranch Bond, at the Harvard Observatory, by Cephas G. Thompson
[WilliamCranchBond.tiff]
- Engraving of the Great Refractor telescope obtained in 1847 by Harvard Observatory
[GreatRefractor.tiff]
- 1850 daguerreotype of the moon, reproduced from Jones, Bessie (Judith) Zaban and Boyd, Lyle Gifford. THE HARVARD COLLEGE OBSERVATORY: THE FIRST FOUR DIRECTORSHIPS, 1839-1919. Cambridge MA: The Belknap Press of Harvard University Press, 1971 [1850moon.tiff]
- One of the series of four daguerreotypes of the partial eclipse of the sun by the moon on July 28, 1851, made at Harvard Observatory by John Adams Whipple, reproduced from Jones, Bessie (Judith) Zaban and Boyd, Lyle Gifford. THE HARVARD COLLEGE OBSERVATORY: THE FIRST FOUR DIRECTORSHIPS, 1839-1919. Cambridge MA: The Belknap Press of Harvard University Press, 1971 [28jul51eclipse.tiff]
- Photograph by the collodion process of the moon, made with the 15-inch refractor at Harvard Observatory by John Adams Whipple on May 8, 1857, reproduced from Jones, Bessie (Judith) Zaban and Boyd, Lyle Gifford. THE HARVARD COLLEGE OBSERVATORY: THE FIRST FOUR DIRECTORSHIPS, 1839-1919. Cambridge MA: The Belknap Press of Harvard University Press, 1971 [8may57moon.tiff]
- Stereoscopic photographs by the collodion process of the moon, made with the 15-inch refractor at Harvard Observatory by John Adams Whipple on February 7 and April 6, 1860, reproduced from Jones, Bessie (Judith) Zaban and Boyd, Lyle Gifford. THE HARVARD COLLEGE OBSERVATORY: THE FIRST FOUR DIRECTORSHIPS, 1839-1919. Cambridge MA: The Belknap Press of Harvard University Press, 1971 [1860moons.tiff]
- Drawing by George Phillips Bond of the solar eclipse of July 28, 1851, made at Lilla Edet, Sweden, reproduced from Jones, Bessie (Judith) Zaban and Boyd, Lyle Gifford. THE HARVARD COLLEGE OBSERVATORY: THE FIRST FOUR DIRECTORSHIPS, 1839-1919. Cambridge MA: The Belknap Press of Harvard University Press, 1971 [28jul51eclipse.tiff]
- 1859-1863 drawing by George Phillips Bond of the nebula in Orion, reproduced from Jones, Bessie (Judith) Zaban and Boyd, Lyle Gifford. THE HARVARD COLLEGE OBSERVATORY: THE FIRST FOUR DIRECTORSHIPS, 1839-1919. Cambridge MA: The Belknap Press of Harvard University Press, 1971 [Orion.tiff]



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"It's all now you see. Yesterday won't be over until tomorrow and tomorrow began ten thousand years ago."

- Remark by character "Garin Stevens"
in William Faulkner's INTRUDER IN THE DUST



Prepared: July 22, 2013

ARRGH AUTOMATED RESearch REPORT GENERATION HOTLINE



This stuff presumably looks to you as if it were generated by a human. Such is not the case. Instead, upon someone's request we have pulled it out of the hat of a pirate that has grown out of the shoulder of our pet parrot "Laura" (depicted above). What these chronological lists are: they are research reports compiled by ARRGH algorithms out of a database of data modules which we term the Kouroo Contexture. This is data mining. To respond to such a request for information, we merely push a button.



ASTRONOMY

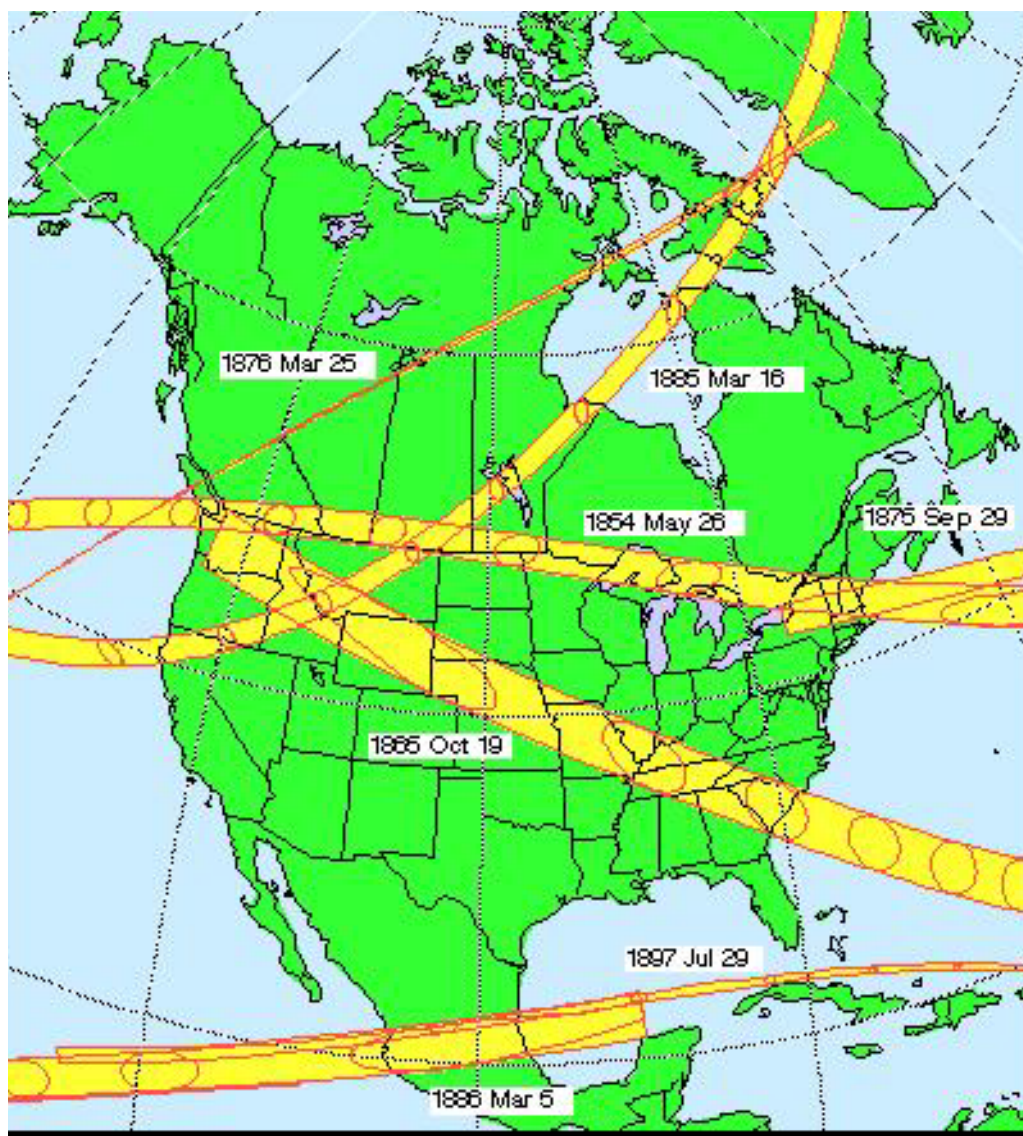
ASTRONOMY

Commonly, the first output of the program has obvious deficiencies and so we need to go back into the data modules stored in the contexture and do a minor amount of tweaking, and then we need to punch that button again and do a recompile of the chronology – but there is nothing here that remotely resembles the ordinary “writerly” process which you know and love. As the contents of this originating contexture improve, and as the programming improves, and as funding becomes available (to date no funding whatever has been needed in the creation of this facility, the entire operation being run out of pocket change) we expect a diminished need to do such tweaking and recompiling, and we fully expect to achieve a simulation of a generous and untiring robotic research librarian. Onward and upward in this brave new world.

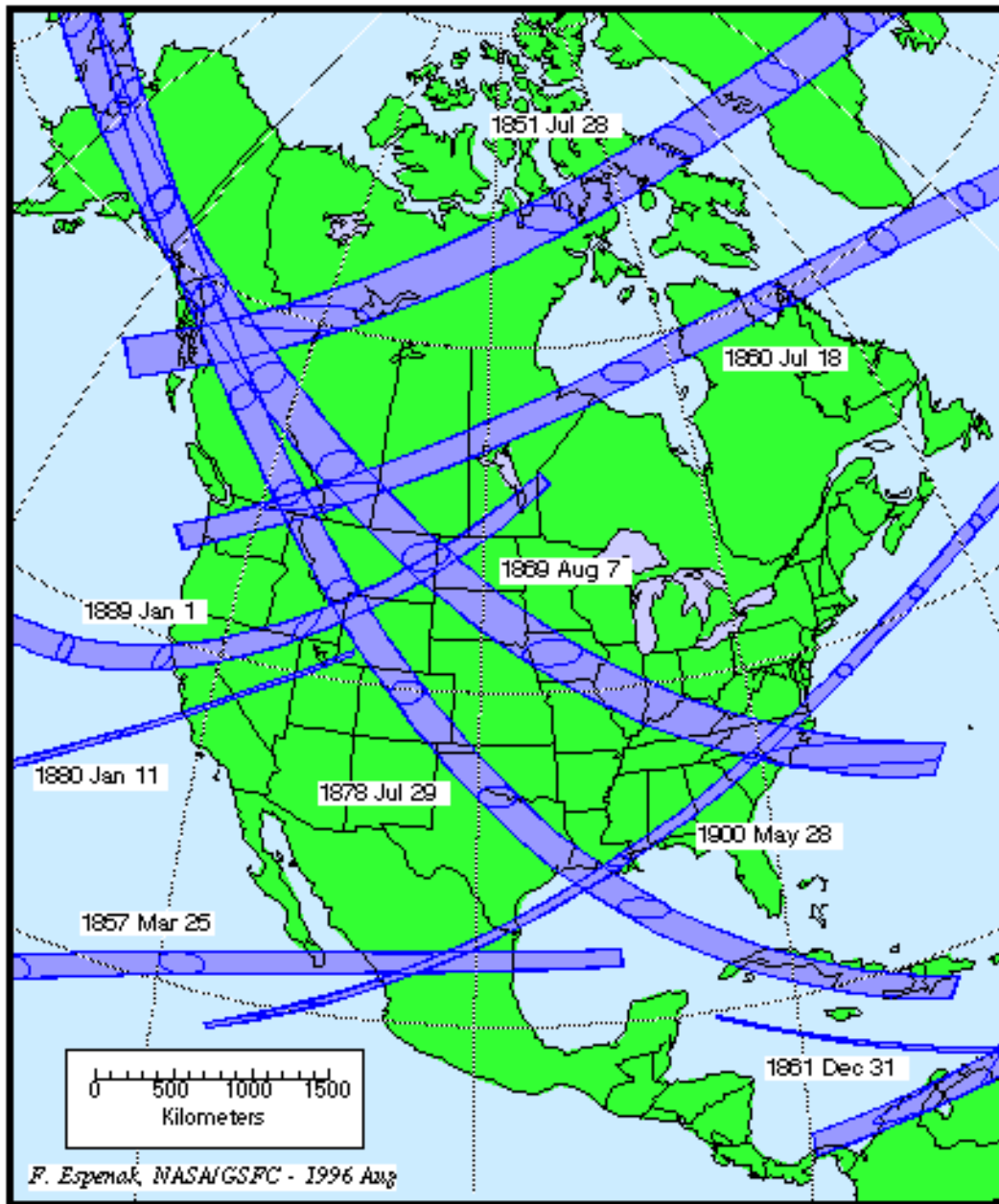
First come first serve. There is no charge.
Place your requests with <Kouroo@kouroo.info>.
Arrgh.

RECORD OF 18TH AND 19TH-CENTURY ANNULAR SOLAR

ECLIPSES



RECORD OF 18TH AND 19TH-CENTURY TOTAL SOLAR ECLIPSES



All eclipse calculations are by Fred Espenak, and he assumes full responsibility for their accuracy. Some of the information presented in these tables is based on data originally published in Fifty Year Canon of Solar Eclipses: 1986 - 2035. Permission is freely granted to reproduce this data when accompanied by an acknowledgment. Fred Espenak, Planetary Systems Branch - Code 693, e-mail <espenak@lepvax.gsfc.nasa.gov>.



NASA/Goddard Space Flight Center, Greenbelt, Maryland
20771 USA, Earth.

During the 18th century, Earth experienced 251 solar eclipses. These events can be broken down into the following categories:

Partial (P) = 91 = 36.3%
Annular (A) = 79 = 31.5%
Total (T) = 63 = 25.1%
Hybrid²⁰⁰ (H) = 18 = 7.2%

During the 19th century, Earth experienced 242 solar eclipses. These events can be broken down into the following categories:

Partial (P) = 87 = 36.0%
Annular (A) = 77 = 31.8%
Total (T) = 63 = 26.0%
Hybrid (H) = 15 = 6.2%

Local circumstances at greatest eclipse for every event during the century are presented in the following table. The date and Universal Time of the instant of greatest eclipse²⁰¹ are found in the first two columns. The eclipse type is given (P=Partial, A=Annular, T=Total or H=Hybrid) along with the Saros series. Gamma is the distance of the shadow axis from Earth's center at greatest eclipse while the eclipse magnitude is defined as the fraction of the Sun's diameter obscured at that instant. The geographic latitude and longitude of the umbra are given for greatest eclipse, along with the Sun's altitude, the width of the path (kilometers) and the duration of totality or annularity. For both partial and non-central umbral eclipses, the latitude and longitude correspond to the point closest to the shadow axis at greatest eclipse. The Sun's altitude is always 0° at this location.

- 1 **Date:** Calendar Date (Gregorian) at instant of Greatest Eclipse (Julian calendar is used before October 15, 1584).
- 2 **Greatest Eclipse:** Time (UT) of Greatest Eclipse, the instant when the axis of the Moon's shadow passes closest to Earth's center.
- 3 **Type:** Type of eclipse where:
P = Partial Eclipse.
A = Annular Eclipse.
T = Total Eclipse.
H = Hybrid or Annular/Total Eclipse.

If the Type ends with:

- "m" = Middle eclipse of Saros series.
- "n" = No northern limit.
- "s" = No southern limit.
- "+" = No northern limit and no center line.
- "-" = No southern limit and no center line.
- "b" = Saros series begins (first eclipse in series).
- "e" = Saros series ends (last eclipse in series).

200. Hybrid eclipses are also known as annular/total eclipses. They occur when the vertex of the Moon's umbral shadow pierces Earth's surface along the central path of an annular eclipse. The eclipse's character then changes to total along the section of the path where the umbral vertex extends beneath Earth's surface. The central paths of hybrid eclipses usually (but not always) begin and end as annular eclipses, but become total along some middle portion of the path.

201. Greatest eclipse is defined as the instant when the axis of the Moon's shadow passes closest to the Earth's center. For total eclipses, the instant of greatest eclipse is virtually identical to the instants of greatest magnitude and greatest duration. However, for annular eclipses, the instant of greatest duration may occur at either the time of greatest eclipse or near the sunrise and sunset points of the eclipse path.



ASTRONOMY

ASTRONOMY

- 4 **Saros #:** Saros series of eclipse.
- 5 **Gamma:** Distance of the shadow cone axis from the center of Earth (units of equatorial radii) at the instant of greatest eclipse.
- 6 **Eclipse Magnitude:** Eclipse magnitude is the fraction of the Sun's diameter obscured by the Moon.
- 7 **Latitude:** Latitude where greatest eclipse is seen.
- 8 **Longitude:** Longitude where greatest eclipse is seen.
- 9 **Sun Altitude:** Sun altitude at greatest eclipse.
- 10 **Path Width:** Width of the path of totality or annularity at greatest eclipse (kilometers).
- 11 **Center Duration:** Central duration of total or annular phase at greatest eclipse.



LOCAL CIRCUMSTANCES AT GREATEST ECLIPSE: 1701 - 1900

Date	Greatest Eclipse	Saros Type #	Gamma	Eclipse Mag.	Lat.	Long.	Sun Path Alt Width	Center Dur.
1701 Feb 07 23:04	A 116	0.667	0.922	25.9N	171.6W	48 393	09m55s	
1701 Aug 04 09:31	T 121	-0.456	1.052	9.5S	33.8E	63 194	05m06s	
1702 Jan 28 01:37	A 126	-0.048	0.964	21.2S	159.7E	87 132	04m14s	
1702 Jul 24 21:38	H 131	0.316	1.000	38.3N	140.3W	71 1	00m01s	
1703 Jan 17 11:24	T 136	-0.734	1.012	67.9S	22.2E	42 61	00m50s	
1703 Jul 14 02:36	P 141	1.120	0.758	67.9N	46.2W	0		
1703 Dec 08 15:41	P 108	1.309	0.427	64.6N	29.4W	0		
1704 Jan 07 02:14	P 146	-1.367	0.318	67.4S	35.5W	0		
1704 Jun 02 13:02	A 113	-0.956	0.954	49.2S	3.5E	16 580	04m26s	
1704 Nov 27 05:33	A 118	0.672	1.000	19.7N	105.0E	48 1	00m01s	
1705 May 22 19:55	Hm 123	-0.153	1.015	12.1N	116.9W	81 51	01m32s	
1705 Nov 16 13:23	A 128	-0.027	0.951	20.4S	24.9W	88 178	05m31s	
1706 May 12 09:35	T 133	0.598	1.059	51.5N	15.3E	53 242	04m06s	
1706 Nov 05 14:23	A 138	-0.740	0.920	57.0S	72.5W	42 448	07m02s	
1707 Apr 02 18:12	P 105	-1.267	0.506	61.1S	10.9W	0		
1707 May 02 02:28	P 143	1.304	0.434	62.2N	21.4E	0		
1707 Sep 25 23:05	P 110	1.464	0.159	61.1N	79.8W	0		
1707 Oct 25 14:17	P 148	-1.416	0.252	61.6S	151.3W	0		
1708 Mar 22 06:51	A 115	-0.588	0.991	30.5S	98.4E	54 37	00m46s	
1708 Sep 14 09:00	T 120	0.669	1.028	39.2N	68.4E	48 126	02m10s	
1709 Mar 11 12:18	Am 125	0.139	0.942	3.4N	5.8W	82 216	06m29s	
1709 Sep 04 00:32	T 130	-0.072	1.070	3.7N	169.8E	86 229	05m47s	
1710 Feb 28 12:07	A 135	0.851	0.919	42.5N	31.1W	31 561	08m00s	
1710 Aug 24 17:17	T 140	-0.803	1.052	36.5S	105.0W	36 282	04m00s	
1711 Jan 18 22:23	P 107	-1.380	0.307	63.5S	14.2W	0		
1711 Feb 17 13:30	P 145	1.507	0.091	61.6N	85.4W	0		
1711 Jul 15 19:22	P 112	1.090	0.821	63.9N	34.7E	0		
1712 Jan 08 09:58	T 117	-0.641	1.026	60.7S	49.3E	50 114	01m48s	
1712 Jul 03 22:34	A 122	0.344	0.950	42.8N	152.7W	70 194	05m18s	
1712 Dec 28 01:24	T 127	0.034	1.047	21.5S	159.1E	88 155	04m15s	
1713 Jun 22 23:15	A 132	-0.421	0.958	1.3S	171.1W	65 170	05m45s	
1713 Dec 17 16:04	H 137	0.725	1.009	23.1N	64.7W	43 47	00m56s	
1714 May 13 18:39	Pe 104	1.486	0.100	69.4N	107.0E	0		
1714 Jun 12 04:40	P 142	-1.161	0.698	66.8S	105.9E	0		
1714 Nov 07 09:04	P 109	-1.463	0.172	70.1S	103.8W	0		
1714 Dec 07 01:27	P 147	1.477	0.142	67.4N	159.1E	0		
1715 May 03 09:36	T 114	0.712	1.063	59.4N	17.9E	44 295	04m14s	
1715 Oct 27 09:02	A 119	-0.794	0.921	62.5S	15.6E	37 494	07m02s	
1716 Apr 22 02:28	T 124	-0.009	1.063	11.8N	142.7E	90 205	05m43s	
1716 Oct 15 10:07	A 129	-0.069	0.957	12.5S	23.5E	86 157	05m10s	
1717 Apr 11 16:34	H 134	-0.766	1.007	39.5S	52.1W	40 39	00m39s	
1717 Oct 04 18:08	H 139	0.656	1.010	34.6N	81.1W	49 47	00m56s	
1718 Mar 02 07:31	P 106	1.373	0.328	71.8N	3.2E	0		
1718 Aug 26 00:41	P 111	-1.227	0.583	71.2S	113.7E	0		
1718 Sep 24 08:34	P 149	1.328	0.388	72.0N	138.4E	0		



ASTRONOMY

ASTRONOMY

1719 Feb 19 06:52	A 116	0.686	0.925	30.6N	68.7E	46	385	09m01s
1719 Aug 15 16:59	T 121	-0.524	1.047	16.8S	81.1W	58	181	04m27s
1720 Feb 08 09:52	A 126	-0.037	0.968	17.4S	36.1E	88	115	03m40s
1720 Aug 04 04:38	A 131	0.241	0.996	31.1N	114.9E	76	16	00m27s
1721 Jan 27 20:05	T 136	-0.727	1.016	64.0S	102.3W	43	79	01m07s
1721 Jul 24 09:06	P 141	1.038	0.899	68.9N	155.1W		0	
1721 Dec 19 00:31	P 108	1.315	0.417	65.7N	171.9W		0	
1722 Jan 17 11:07	P 146	-1.363	0.325	68.5S	179.8W		0	
1722 Jun 13 19:40	P 113	-1.037	0.907	65.2S	93.4W		0	
1722 Dec 08 14:07	A 118	0.681	0.996	19.5N	25.4W	47	21	00m28s
1723 Jun 03 03:05	T 123	-0.225	1.020	9.6N	136.2E	77	69	02m05s
1723 Nov 27 21:28	A 128	-0.012	0.947	22.0S	145.1W	89	195	06m12s
1724 May 22 17:10	T 133	0.532	1.064	50.8N	92.8W	58	247	04m33s
1724 Nov 15 22:07	A 138	-0.718	0.917	59.8S	175.1E	44	448	07m15s
1725 Apr 13 02:11	P 105	-1.313	0.417	61.4S	139.4W		0	
1725 May 12 10:12	P 143	1.247	0.545	62.8N	103.7W		0	
1725 Oct 06 06:39	P 110	1.503	0.090	61.2N	157.8E		0	
1725 Nov 04 22:02	P 148	-1.386	0.304	62.1S	83.5E		0	
1726 Apr 02 14:38	A 115	-0.632	0.991	29.2S	18.3W	51	42	00m52s
1726 Sep 25 16:51	T 120	0.714	1.027	38.0N	48.9W	44	129	02m07s
1727 Mar 22 19:47	A 125	0.099	0.943	5.7N	117.9W	84	211	06m20s
1727 Sep 15 08:27	T 130	-0.020	1.068	2.2N	51.5E	89	222	05m33s
1728 Mar 10 19:38	A 135	0.817	0.923	42.8N	144.5W	35	485	07m25s
1728 Sep 04 00:59	T 140	-0.746	1.048	35.0S	139.7E	41	236	03m44s
1729 Jan 29 06:48	P 107	-1.384	0.298	62.8S	149.8W		0	
1729 Feb 27 21:27	P 145	1.481	0.134	61.2N	146.6E		0	
1729 Jul 26 02:10	P 112	1.172	0.674	63.1N	76.7W		0	
1729 Aug 24 13:48	Pb 150	-1.543	0.006	61.7S	95.2W		0	
1730 Jan 18 18:45	T 117	-0.644	1.029	57.8S	77.4W	50	126	01m59s
1730 Jul 15 04:59	A 122	0.433	0.948	46.3N	116.0E	64	210	05m13s
1731 Jan 08 10:17	Tm 127	0.031	1.046	20.7S	27.0E	88	155	04m10s
1731 Jul 04 05:46	A 132	-0.334	0.960	3.8N	90.8E	71	153	05m15s
1731 Dec 29 00:46	H 137	0.723	1.006	22.7N	162.2E	44	32	00m39s
1732 Jun 22 11:38	P 142	-1.080	0.846	65.8S	9.3W		0	
1732 Nov 17 16:58	P 109	-1.484	0.138	69.2S	125.3E		0	
1732 Dec 17 09:47	P 147	1.475	0.147	66.3N	23.5E		0	
1733 May 13 17:18	T 114	0.771	1.066	67.9N	99.4W	39	339	04m06s
1733 Nov 06 16:40	A 119	-0.821	0.918	69.0S	101.1W	34	548	06m53s
1734 May 03 10:16	T 124	0.047	1.063	18.4N	24.7E	87	208	05m46s
1734 Oct 26 17:53	A 129	-0.100	0.957	18.2S	93.7W	84	159	05m08s
1735 Apr 23 00:11	H 134	-0.716	1.008	32.1S	171.0W	44	38	00m44s
1735 Oct 16 02:10	H 139	0.620	1.011	28.2N	155.3E	51	48	01m02s
1736 Mar 12 15:05	P 106	1.405	0.272	72.1N	124.5W		0	
1736 Apr 11 07:18	Pb 144	-1.516	0.075	71.5S	134.5E		0	
1736 Sep 05 08:30	P 111	-1.282	0.477	71.7S	17.1W		0	
1736 Oct 04 16:41	P 149	1.287	0.467	71.9N	2.5E		0	
1737 Mar 01 14:35	A 116	0.710	0.928	36.0N	50.1W	45	378	08m04s
1737 Aug 26 00:32	T 121	-0.589	1.041	24.4S	162.6E	54	167	03m44s
1738 Feb 18 18:02	A 126	-0.021	0.973	12.7S	86.6W	89	96	03m03s
1738 Aug 15 11:40	Am 131	0.168	0.991	23.7N	8.5E	80	33	01m00s
1739 Feb 08 04:41	T 136	-0.715	1.020	59.2S	131.0E	44	99	01m27s



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1739 Aug 04 15:40	A 141	0.958	0.941	80.0N	42.6E	16	798	03m59s
1739 Dec 30 09:22	P 108	1.321	0.406	66.7N	45.1E		0	
1740 Jan 28 19:55	P 146	-1.355	0.339	69.5S	36.3E		0	
1740 Jun 24 02:18	P 113	-1.117	0.769	66.2S	156.7E		0	
1740 Dec 18 22:43	A 118	0.688	0.992	19.9N	156.4W	46	40	00m53s
1741 Jun 13 10:12	T 123	-0.301	1.024	6.0N	29.5E	73	85	02m35s
1741 Dec 08 05:38	A 128	-0.002	0.943	23.0S	93.7E	90	209	06m51s
1742 Jun 03 00:40	T 133	0.460	1.068	48.9N	160.3E	62	251	05m00s
1742 Nov 27 05:59	A 138	-0.702	0.916	62.6S	62.3E	45	450	07m26s
1743 Apr 24 10:00	P 105	-1.369	0.313	61.8S	94.5E		0	
1743 May 23 17:49	P 143	1.183	0.667	63.5N	132.9E		0	
1743 Oct 17 14:25	Pe 110	1.534	0.037	61.5N	32.6E		0	
1743 Nov 16 05:58	P 148	-1.363	0.342	62.8S	44.4W		0	
1744 Apr 12 22:15	A 115	-0.682	0.990	29.1S	132.6W	47	49	00m59s
1744 Oct 06 00:51	T 120	0.752	1.026	37.0N	169.0W	41	133	02m04s
1745 Apr 02 03:09	A 125	0.053	0.944	7.7N	132.2E	87	205	06m13s
1745 Sep 25 16:28	Tm 130	0.027	1.065	0.3N	68.5W	88	214	05m21s
1746 Mar 22 03:02	A 135	0.777	0.928	43.4N	104.8E	39	418	06m51s
1746 Sep 15 08:46	T 140	-0.695	1.044	34.9S	23.1E	46	200	03m23s
1747 Feb 09 15:11	P 107	-1.391	0.285	62.1S	75.6E		0	
1747 Mar 11 05:18	P 145	1.450	0.186	61.0N	20.2E		0	
1747 Aug 06 09:01	P 112	1.251	0.533	62.4N	171.5E		0	
1747 Sep 04 21:08	P 150	-1.488	0.108	61.4S	146.1E		0	
1748 Jan 30 03:29	T 117	-0.650	1.032	54.4S	154.9E	49	140	02m12s
1748 Jul 25 11:27	A 122	0.518	0.946	48.7N	24.6E	59	231	05m12s
1749 Jan 18 19:09	T 127	0.026	1.046	19.1S	104.8W	89	155	04m07s
1749 Jul 14 12:19	A 132	-0.247	0.962	7.8N	7.1W	76	141	04m46s
1750 Jan 08 09:28	H 137	0.721	1.004	23.0N	29.4E	44	20	00m24s
1750 Jul 03 18:38	A- 142	-0.998	0.996	64.8S	124.3W		0	
1750 Nov 29 00:58	P 109	-1.501	0.113	68.2S	6.2W		0	
1750 Dec 28 18:06	P 147	1.474	0.151	65.3N	111.7W		0	
1751 May 25 00:55	T 114	0.836	1.067	77.0N	144.7E	33	402	03m53s
1751 Nov 18 00:26	A 119	-0.841	0.916	74.9S	142.8E	32	597	06m45s
1752 May 13 17:56	T 124	0.109	1.064	24.9N	91.1W	84	210	05m42s
1752 Nov 06 01:48	A 129	-0.124	0.957	23.2S	147.5E	83	159	05m03s
1753 May 03 07:39	H 134	-0.660	1.008	24.8S	73.0E	49	36	00m48s
1753 Oct 26 10:22	H 139	0.591	1.011	22.7N	29.7E	54	49	01m08s
1754 Mar 23 22:29	P 106	1.447	0.202	72.1N	110.6E		0	
1754 Apr 22 14:26	P 144	-1.463	0.167	71.0S	14.1E		0	
1754 Sep 16 16:25	P 111	-1.332	0.381	72.0S	149.9W		0	
1754 Oct 16 00:57	P 149	1.253	0.531	71.5N	135.5W		0	
1755 Mar 12 22:09	A 116	0.742	0.932	42.3N	167.4W	42	375	07m07s
1755 Sep 06 08:09	T 121	-0.648	1.034	32.1S	44.4E	49	150	03m00s
1756 Mar 01 02:07	A 126	0.001	0.979	7.5S	151.5E	90	76	02m24s
1756 Aug 25 18:46	A 131	0.101	0.985	16.1N	99.5W	84	52	01m38s
1757 Feb 18 13:14	T 136	-0.700	1.025	53.8S	2.9E	45	119	01m51s
1757 Aug 14 22:16	A 141	0.881	0.941	71.6N	113.5W	28	467	04m36s
1758 Jan 09 18:13	P 108	1.325	0.397	67.8N	98.7W		0	
1758 Feb 08 04:40	P 146	-1.347	0.355	70.4S	107.7W		0	
1758 Jul 05 08:57	P 113	-1.196	0.630	67.2S	46.4E		0	
1758 Dec 30 07:20	A 118	0.693	0.989	20.8N	72.3E	46	56	01m15s



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1759 Jun 24 17:21	T 123	-0.377	1.028	1.4N	78.0W	68	101	02m59s
1759 Dec 19 13:50	A 128	0.005	0.940	23.3S	28.0W	90	221	07m25s
1760 Jun 13 08:09	T 133	0.388	1.072	46.0N	52.8E	67	254	05m27s
1760 Dec 07 13:53	A 138	-0.688	0.914	64.7S	49.3W	46	450	07m36s
1761 May 04 17:43	P 105	-1.428	0.202	62.4S	30.2W		0	
1761 Jun 03 01:22	P 143	1.118	0.794	64.4N	9.9E		0	
1761 Nov 26 14:00	P 148	-1.345	0.373	63.7S	174.2W		0	
1762 Apr 24 05:42	A 115	-0.740	0.988	30.4S	115.7E	42	61	01m08s
1762 Oct 17 09:00	T 120	0.784	1.025	36.2N	67.7E	38	135	02m02s
1763 Apr 13 10:19	A 125	-0.001	0.946	9.0N	25.4E	90	201	06m11s
1763 Oct 07 00:39	T 130	0.067	1.063	2.0S	169.2E	86	206	05m09s
1764 Apr 01 10:17	A 135	0.729	0.932	44.2N	2.5W	43	360	06m20s
1764 Sep 25 16:41	T 140	-0.650	1.039	36.0S	95.4W	49	171	03m01s
1765 Feb 19 23:28	P 107	-1.403	0.262	61.6S	57.6W		0	
1765 Mar 21 13:01	P 145	1.412	0.251	61.0N	104.4W		0	
1765 Aug 16 15:54	P 112	1.328	0.398	61.8N	59.3E		0	
1765 Sep 15 04:32	P 150	-1.438	0.200	61.1S	26.1E		0	
1766 Feb 09 12:09	T 117	-0.660	1.035	50.7S	26.6E	48	156	02m27s
1766 Aug 05 17:56	A 122	0.602	0.943	50.2N	66.9W	53	260	05m15s
1767 Jan 30 03:56	T 127	0.019	1.047	16.8S	123.9E	89	157	04m06s
1767 Jul 25 18:55	A 132	-0.163	0.964	10.8N	105.4W	81	132	04m21s
1768 Jan 19 18:09	H 137	0.719	1.002	23.9N	103.2W	44	11	00m13s
1768 Jul 14 01:40	H 142	-0.917	1.006	43.0S	137.5E	23	48	00m29s
1768 Dec 09 09:01	P 109	-1.513	0.093	67.1S	138.1W		0	
1769 Jan 08 02:26	P 147	1.473	0.153	64.3N	113.5E		0	
1769 Jun 04 08:28	T 114	0.904	1.067	87.3N	26.0E	25	522	03m36s
1769 Nov 28 08:18	A 119	-0.856	0.914	80.0S	32.0E	31	639	06m38s
1770 May 25 01:30	T 124	0.176	1.063	31.2N	155.6E	80	211	05m31s
1770 Nov 17 09:51	A 129	-0.142	0.957	27.3S	27.2E	82	158	04m56s
1771 May 14 15:00	H 134	-0.598	1.008	17.8S	40.4W	53	33	00m49s
1771 Nov 06 18:41	H 139	0.567	1.012	17.9N	97.3W	55	50	01m13s
1772 Apr 03 05:43	P 106	1.494	0.122	71.9N	12.3W		0	
1772 May 02 21:26	P 144	-1.404	0.268	70.2S	104.0W		0	
1772 Sep 27 00:28	P 111	-1.375	0.298	72.0S	75.4E		0	
1772 Oct 26 09:21	P 149	1.225	0.584	70.9N	85.2E		0	
1773 Mar 23 05:37	A 116	0.779	0.936	49.3N	76.3E	39	378	06m13s
1773 Sep 16 15:52	T 121	-0.702	1.028	40.0S	75.5W	45	130	02m18s
1774 Mar 12 10:05	A 126	0.029	0.985	1.6S	30.8E	88	55	01m43s
1774 Sep 06 01:57	A 131	0.038	0.980	8.7N	150.9E	88	72	02m20s
1775 Mar 01 21:39	T 136	-0.678	1.030	47.9S	124.7W	47	139	02m20s
1775 Aug 26 04:59	A 141	0.809	0.939	61.3N	132.1E	36	383	05m16s
1776 Jan 21 03:02	P 108	1.332	0.384	68.8N	117.7E		0	
1776 Feb 19 13:20	P 146	-1.333	0.380	71.1S	109.3E		0	
1776 Jul 15 15:39	P 113	-1.274	0.493	68.2S	65.1W		0	
1776 Aug 14 05:22	Pb 151	1.536	0.044	70.6N	123.4W		0	
1777 Jan 09 15:55	A 118	0.699	0.986	22.5N	58.8W	45	70	01m32s
1777 Jul 05 00:29	T 123	-0.453	1.030	4.2S	173.7E	63	116	03m17s
1777 Dec 29 22:03	A 128	0.011	0.938	22.7S	150.0W	89	231	07m53s
1778 Jun 24 15:35	T 133	0.312	1.075	41.8N	55.0W	72	255	05m53s
1778 Dec 18 21:53	A 138	-0.679	0.914	65.8S	160.6W	47	450	07m44s
1779 May 16 01:17	Pe 105	-1.493	0.078	63.0S	153.0W		0	



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1779 Jun 14 08:51	P 143	1.049	0.928	65.3N	112.1W	0	
1779 Dec 07 22:08	P 148	-1.331	0.396	64.6S	54.2E	0	
1780 May 04 13:00	A 115	-0.804	0.986	33.3S	6.0E	36	81 01m21s
1780 Oct 27 17:18	T 120	0.808	1.024	35.6N	58.5W	36	138 02m00s
1781 Apr 23 17:21	A 125	-0.062	0.947	9.7N	79.2W	86	197 06m13s
1781 Oct 17 08:56	T 130	0.101	1.060	4.3S	45.1E	84	197 04m59s
1782 Apr 12 17:24	A 135	0.674	0.937	45.1N	107.1W	47	311 05m51s
1782 Oct 07 00:43	T 140	-0.611	1.034	37.8S	144.6E	52	144 02m37s
1783 Mar 03 07:40	P 107	-1.420	0.230	61.3S	170.7E	0	
1783 Apr 01 20:38	P 145	1.367	0.329	61.0N	132.8E	0	
1783 Aug 27 22:52	P 112	1.399	0.274	61.4N	54.0W	0	
1783 Sep 26 12:04	P 150	-1.393	0.280	61.1S	95.5W	0	
1784 Feb 20 20:45	T 117	-0.674	1.039	47.2S	101.5W	47	174 02m44s
1784 Aug 16 00:31	A 122	0.682	0.940	50.9N	159.7W	47	299 05m23s
1785 Feb 09 12:40	T 127	0.008	1.048	14.1S	6.6W	90	159 04m07s
1785 Aug 05 01:37	A 132	-0.082	0.965	12.7N	155.4E	85	127 04m01s
1786 Jan 30 02:45	H 137	0.714	1.001	25.1N	125.5E	44	5 00m05s
1786 Jul 25 08:46	T 142	-0.838	1.011	34.6S	30.9E	33	66 00m59s
1786 Dec 20 17:07	P 109	-1.523	0.077	66.0S	90.0E	0	
1787 Jan 19 10:43	P 147	1.470	0.159	63.4N	20.1W	0	
1787 Jun 15 15:59	T 114	0.974	1.065	78.6N	104.9E	12	999 03m09s
1787 Dec 09 16:15	A 119	-0.868	0.914	83.4S	62.6W	29	672 06m32s
1788 Jun 04 08:59	T 124	0.247	1.062	37.0N	44.4E	76	211 05m15s
1788 Nov 27 18:02	A 129	-0.154	0.958	30.4S	94.3W	81	155 04m46s
1789 May 24 22:12	H 134	-0.530	1.007	11.0S	151.0W	58	28 00m46s
1789 Nov 17 03:08	H 139	0.550	1.013	14.1N	133.9E	57	52 01m19s
1790 Apr 14 12:48	Pe 106	1.549	0.028	71.4N	132.1W	0	
1790 May 14 04:17	P 144	-1.337	0.384	69.4S	141.0E	0	
1790 Oct 08 08:38	P 111	-1.412	0.228	71.7S	61.3W	0	
1790 Nov 06 17:53	P 149	1.204	0.624	70.1N	55.7W	0	
1791 Apr 03 12:55	A 116	0.824	0.939	57.2N	39.5W	34	394 05m21s
1791 Sep 27 23:42	T 121	-0.749	1.021	47.6S	162.4E	41	106 01m38s
1792 Mar 22 17:57	A 126	0.062	0.991	4.5N	88.7W	86	33 01m02s
1792 Sep 16 09:13	A 131	-0.019	0.974	1.3N	39.9E	89	93 03m02s
1793 Mar 12 06:00	T 136	-0.652	1.036	41.7S	107.8E	49	158 02m51s
1793 Sep 05 11:47	A 141	0.741	0.937	51.7N	23.1E	42	346 06m02s
1794 Jan 31 11:48	P 108	1.341	0.368	69.8N	26.0W	0	
1794 Mar 01 21:54	P 146	-1.315	0.413	71.6S	32.8W	0	
1794 Jul 26 22:24	P 113	-1.350	0.359	69.1S	178.0W	0	
1794 Aug 25 12:09	P 151	1.461	0.171	71.3N	122.0E	0	
1795 Jan 21 00:29	A 118	0.706	0.984	24.8N	170.3E	45	81 01m45s
1795 Jul 16 07:41	T 123	-0.528	1.033	10.4S	63.8E	58	130 03m26s
1796 Jan 10 06:14	A 128	0.018	0.936	21.1S	88.3E	89	238 08m15s
1796 Jul 04 23:03	T 133	0.238	1.076	36.8N	164.6W	76	255 06m15s
1796 Dec 29 05:55	A 138	-0.670	0.914	65.5S	88.6E	48	446 07m51s
1797 Jun 24 16:18	T 143	0.978	1.057	77.3N	134.0E	11	970 02m47s
1797 Dec 18 06:21	P 148	-1.321	0.415	65.6S	79.0W	0	
1798 May 15 20:10	A 115	-0.875	0.983	38.6S	101.5W	29	121 01m36s
1798 Nov 08 01:44	T 120	0.827	1.024	35.2N	172.5E	34	141 01m59s
1799 May 05 00:13	A 125	-0.131	0.948	9.3N	178.9E	83	194 06m20s
1799 Oct 28 17:21	T 130	0.128	1.057	6.7S	81.2W	83	188 04m50s



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1800 Apr 24 00:24	A 135	0.612	0.942	45.7N	151.4E	52	269	05m27s
1800 Oct 18 08:52	T 140	-0.579	1.029	40.3S	23.2E	54	120	02m14s
1801 Mar 14 15:45	P 107	-1.444	0.186	61.2S	40.7E		0	
1801 Apr 13 04:08	P 145	1.315	0.420	61.3N	11.7E		0	
1801 Sep 08 05:54	P 112	1.466	0.160	61.1N	168.4W		0	
1801 Oct 07 19:42	P 150	-1.355	0.349	61.2S	141.2E		0	
1802 Mar 04 05:14	T 117	-0.694	1.043	44.1S	131.6E	46	196	03m02s
1802 Aug 28 07:12	A 122	0.757	0.937	51.3N	105.7E	41	354	05m35s
1803 Feb 21 21:18	T 127	-0.008	1.049	11.1S	135.9W	89	163	04m09s
1803 Aug 17 08:25	A 132	-0.005	0.966	13.6N	54.7E	90	124	03m47s
1804 Feb 11 11:16	H 137	0.705	1.000	26.7N	4.4W	45	0	00m00s
1804 Aug 05 15:57	T 142	-0.762	1.014	29.3S	77.0W	40	75	01m20s
1805 Jan 01 01:15	P 109	-1.532	0.064	65.0S	42.0W		0	
1805 Jan 30 18:57	P 147	1.465	0.167	62.7N	152.8W		0	
1805 Jun 26 23:27	P 114	1.046	0.935	65.5N	9.8W		0	
1805 Jul 26 06:14	Pb 152	-1.457	0.140	63.2S	42.8E		0	
1805 Dec 21 00:17	A 119	-0.875	0.913	83.1S	143.7W	29	693	06m26s
1806 Jun 16 16:24	T 124	0.320	1.060	42.2N	64.5W	71	210	04m55s
1806 Dec 10 02:19	A 129	-0.163	0.959	32.4S	143.4E	80	151	04m32s
1807 Jun 06 05:18	H 134	-0.458	1.005	4.7S	100.4E	63	21	00m38s
1807 Nov 29 11:42	H 139	0.538	1.014	11.1N	3.9E	57	55	01m26s
1808 May 25 11:02	P 144	-1.266	0.506	68.4S	27.9E		0	
1808 Oct 19 16:55	P 111	-1.444	0.168	71.3S	160.8E		0	
1808 Nov 18 02:30	P 149	1.187	0.657	69.2N	162.7E		0	
1809 Apr 14 20:07	A 116	0.874	0.943	65.8N	157.3W	29	436	04m35s
1809 Oct 09 07:38	T 121	-0.791	1.014	55.1S	38.4E	37	77	01m02s
1810 Apr 04 01:41	A 126	0.103	0.997	11.1N	153.8E	84	12	00m21s
1810 Sep 28 16:37	A 131	-0.070	0.968	5.8S	72.8W	86	115	03m45s
1811 Mar 24 14:12	T 136	-0.619	1.042	35.1S	18.0W	52	176	03m27s
1811 Sep 17 18:43	A 141	0.680	0.934	43.0N	85.9W	47	330	06m51s
1812 Feb 12 20:28	P 108	1.355	0.341	70.7N	168.8W		0	
1812 Mar 13 06:19	P 146	-1.291	0.459	71.9S	173.3W		0	
1812 Aug 07 05:16	P 113	-1.421	0.234	70.0S	67.0E		0	
1812 Sep 05 19:04	P 151	1.394	0.287	71.8N	4.5E		0	
1813 Feb 01 08:58	A 118	0.715	0.982	28.0N	40.4E	44	91	01m53s
1813 Jul 27 14:55	T 123	-0.601	1.034	17.5S	47.4W	53	144	03m27s
1814 Jan 21 14:24	A 128	0.026	0.935	18.6S	33.4W	89	242	08m28s
1814 Jul 17 06:30	T 133	0.164	1.077	30.9N	84.7E	80	254	06m33s
1815 Jan 10 13:57	A 138	-0.662	0.914	63.7S	23.5W	48	438	07m55s
1815 Jul 06 23:43	T 143	0.906	1.059	88.1N	162.8W	25	469	03m13s
1815 Dec 30 14:38	P 148	-1.313	0.428	66.7S	146.5E		0	
1816 May 27 03:13	A 115	-0.949	0.979	48.0S	153.6E	18	238	01m54s
1816 Nov 19 10:17	T 120	0.841	1.023	35.0N	41.5E	32	145	02m00s
1817 May 16 06:58	A 125	-0.205	0.948	7.9N	78.5E	78	194	06m30s
1817 Nov 09 01:54	T 130	0.149	1.054	8.9S	150.9E	81	179	04m42s
1818 May 05 07:16	A 135	0.544	0.946	45.8N	52.5E	57	233	05m05s
1818 Oct 29 17:07	T 140	-0.552	1.024	43.1S	99.4W	56	98	01m51s
1819 Mar 25 23:44	P 107	-1.472	0.131	61.2S	87.8W		0	
1819 Apr 24 11:32	P 145	1.258	0.522	61.7N	108.1W		0	
1819 Sep 19 13:03	Pe 112	1.526	0.058	61.0N	75.7E		0	
1819 Oct 19 03:27	P 150	-1.323	0.408	61.5S	16.3E		0	



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1820 Mar 14 13:37	T 117	-0.720	1.047	41.5S	5.8E	44	220	03m20s
1820 Sep 07 14:00	A 122	0.825	0.933	51.6N	8.7E	34	433	05m49s
1821 Mar 04 05:50	T 127	-0.028	1.051	8.0S	96.3E	88	168	04m14s
1821 Aug 27 15:19	A 132	0.067	0.966	13.6N	47.7W	86	123	03m38s
1822 Feb 21 19:40	A 137	0.691	1.000	28.6N	132.3W	46	2	00m02s
1822 Aug 16 23:14	T 142	-0.690	1.017	26.1S	173.6E	46	80	01m35s
1823 Jan 12 09:20	P 109	-1.541	0.048	64.0S	173.0W		0	
1823 Feb 11 03:03	P 147	1.454	0.185	62.0N	76.7E		0	
1823 Jul 08 06:56	P 114	1.118	0.795	64.6N	131.9W		0	
1823 Aug 06 13:45	P 152	-1.387	0.275	62.5S	79.3W		0	
1824 Jan 01 08:21	A 119	-0.882	0.914	79.9S	116.3E	28	706	06m21s
1824 Jun 26 23:46	T 124	0.396	1.058	46.6N	171.4W	66	207	04m31s
1824 Dec 20 10:40	Am 129	-0.169	0.961	33.3S	20.5E	80	144	04m15s
1825 Jun 16 12:19	H 134	-0.381	1.004	1.0N	6.0W	68	13	00m25s
1825 Dec 09 20:22	H 139	0.530	1.015	9.2N	127.4W	58	60	01m34s
1826 Jun 05 17:39	P 144	-1.189	0.641	67.4S	82.4W		0	
1826 Oct 31 01:20	P 111	-1.470	0.122	70.6S	21.2E		0	
1826 Nov 29 11:14	P 149	1.176	0.677	68.2N	20.0E		0	
1827 Apr 26 03:11	A 116	0.932	0.946	74.8N	73.4E	21	560	03m53s
1827 Oct 20 15:42	H 121	-0.825	1.007	62.3S	87.6W	34	43	00m30s
1828 Apr 14 09:19	Hm 126	0.150	1.003	17.9N	37.7E	81	10	00m18s
1828 Oct 09 00:08	A 131	-0.114	0.962	12.5S	173.0E	83	137	04m26s
1829 Apr 03 22:18	T 136	-0.580	1.047	28.5S	142.6W	54	192	04m05s
1829 Sep 28 01:47	A 141	0.624	0.932	34.9N	164.4E	51	323	07m43s
1830 Feb 23 05:04	P 108	1.372	0.309	71.3N	48.9E		0	
1830 Mar 24 14:39	P 146	-1.262	0.514	72.0S	47.7E		0	
1830 Aug 18 12:13	P 113	-1.487	0.116	70.7S	50.2W		0	
1830 Sep 17 02:08	P 151	1.332	0.393	72.1N	115.5W		0	
1831 Feb 12 17:22	A 118	0.729	0.981	31.9N	88.3W	43	100	01m57s
1831 Aug 07 22:16	T 123	-0.669	1.035	24.9S	160.9W	48	158	03m20s
1832 Feb 01 22:30	A 128	0.036	0.934	15.3S	154.4W	88	245	08m35s
1832 Jul 27 14:01	T 133	0.092	1.078	24.5N	27.9W	85	252	06m46s
1833 Jan 20 21:57	A 138	-0.653	0.916	60.6S	137.4W	49	426	07m59s
1833 Jul 17 07:08	T 143	0.835	1.059	77.5N	92.5E	33	357	03m29s
1834 Jan 09 22:55	P 148	-1.304	0.442	67.8S	11.3E		0	
1834 Jun 07 10:08	P 115	-1.029	0.929	64.6S	55.4E		0	
1834 Nov 30 18:56	T 120	0.850	1.023	35.0N	91.6W	32	150	02m02s
1835 May 27 13:36	A 125	-0.285	0.949	5.3N	20.2W	73	196	06m44s
1835 Nov 20 10:32	T 130	0.165	1.051	10.7S	21.6E	81	171	04m35s
1836 May 15 14:02	A 135	0.470	0.951	45.1N	44.4W	62	203	04m47s
1836 Nov 09 01:29	T 140	-0.533	1.019	46.1S	136.8E	58	77	01m28s
1837 Apr 05 07:35	Pe 107	-1.508	0.063	61.3S	145.7E		0	
1837 May 04 18:48	P 145	1.193	0.638	62.3N	133.9E		0	
1837 Oct 29 11:19	P 150	-1.297	0.453	61.9S	110.5W		0	
1838 Mar 25 21:52	T 117	-0.753	1.050	39.8S	118.3W	41	249	03m39s
1838 Sep 18 20:56	A 122	0.887	0.929	52.4N	90.5W	27	562	06m06s
1839 Mar 15 14:14	T 127	-0.056	1.052	5.1S	29.5W	87	173	04m20s
1839 Sep 07 22:23	Am 132	0.133	0.966	12.8N	152.6W	82	123	03m34s
1840 Mar 04 03:58	A 137	0.673	1.000	30.6N	101.8E	48	2	00m03s
1840 Aug 27 06:37	T 142	-0.622	1.019	24.3S	63.0E	51	83	01m45s



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1841	Jan	22	17:24	P 109	-1.552	0.031	63.1S	56.6E	0			
1841	Feb	21	11:04	P 147	1.441	0.209	61.5N	52.4W	0			
1841	Jul	18	14:25	P 114	1.190	0.655	63.7N	106.3E	0			
1841	Aug	16	21:20	P 152	-1.319	0.405	61.9S	158.0E	0			
1842	Jan	11	16:26	A 119	-0.888	0.915	75.8S	1.5E	27	711	06m15s	
1842	Jul	08	07:06	T 124	0.473	1.054	50.1N	83.6E	62	204	04m05s	
1842	Dec	31	19:04	A 129	-0.173	0.963	33.1S	103.2W	80	135	03m54s	
1843	Jun	27	19:17	H 134	-0.304	1.001	5.9N	111.0W	72	4	00m07s	
1843	Dec	21	05:03	T 139	0.523	1.016	8.0N	101.0E	58	66	01m43s	
1844	Jun	16	00:13	P 144	-1.109	0.778	66.4S	168.3E	0			
1844	Nov	10	09:52	P 111	-1.490	0.084	69.8S	119.3W	0			
1844	Dec	09	20:02	P 149	1.168	0.692	67.1N	123.0W	0			
1845	May	06	10:09	An 116	0.995	0.946	73.3N	110.7W	4	-	03m15s	
1845	Oct	30	23:52	H 121	-0.854	1.000	69.1S	144.6E	31	3	00m02s	
1846	Apr	25	16:50	H 126	0.204	1.009	24.8N	76.2W	78	31	00m53s	
1846	Oct	20	07:46	A 131	-0.151	0.957	18.7S	57.3E	81	159	05m05s	
1847	Apr	15	06:16	T 136	-0.534	1.053	21.6S	95.1E	58	206	04m44s	
1847	Oct	09	09:00	A 141	0.577	0.929	27.7N	52.8E	55	323	08m35s	
1848	Mar	05	13:31	P 108	1.395	0.265	71.8N	91.8W	0			
1848	Apr	03	22:49	P 146	-1.226	0.583	71.8S	89.0W	0			
1848	Aug	28	19:18	Pe 113	-1.548	0.008	71.3S	169.7W	0			
1848	Sep	27	09:21	P 151	1.277	0.487	72.2N	122.0E	0			
1849	Feb	23	01:38	A 118	0.748	0.980	36.7N	144.3E	41	108	01m58s	
1849	Aug	18	05:41	T 123	-0.734	1.035	32.9S	83.5E	43	172	03m07s	
1850	Feb	12	06:29	A 128	0.050	0.934	11.0S	85.6E	87	245	08m35s	
1850	Aug	07	21:34	T 133	0.021	1.077	17.7N	141.8W	89	249	06m50s	
1851	Feb	01	05:54	A 138	-0.641	0.917	56.4S	106.9E	50	409	08m01s	
1851	Jul	28	14:34	T 143	0.764	1.058	68.0N	19.6W	40	296	03m41s	
1852	Jan	21	07:12	P 148	-1.295	0.458	68.9S	124.3W	0			
1852	Jun	17	17:00	P 115	-1.111	0.782	65.6S	57.3W	0			
1852	Dec	11	03:41	T 120	0.855	1.024	35.2N	133.9E	31	156	02m05s	
1853	Jun	06	20:07	A 125	-0.369	0.949	1.5N	117.9W	68	203	06m59s	
1853	Nov	30	19:15	T 130	0.177	1.049	12.0S	109.0W	80	164	04m28s	
1854	May	26	20:43	A 135	0.392	0.955	43.3N	140.0W	67	178	04m32s	
1854	Nov	20	09:57	H 140	-0.518	1.014	48.8S	12.7E	59	57	01m07s	
1855	May	16	02:01	P 145	1.125	0.762	62.9N	16.6E	0			
1855	Nov	09	19:18	P 150	-1.277	0.489	62.5S	120.9E	0			
1856	Apr	05	06:01	T 117	-0.791	1.054	39.1S	119.3E	37	285	03m56s	
1856	Sep	29	04:00	A 122	0.942	0.925	54.4N	169.2E	19	832	06m21s	
1857	Mar	25	22:29	T 127	-0.089	1.053	2.4S	153.4W	85	177	04m28s	
1857	Sep	18	05:36	A 132	0.191	0.966	11.6N	100.0E	79	125	03m34s	
1858	Mar	15	12:05	A 137	0.646	1.000	32.6N	20.8W	50	2	00m02s	
1858	Sep	07	14:09	T 142	-0.561	1.021	23.9S	49.8W	56	85	01m50s	
1859	Feb	03	01:23	Pe 109	-1.566	0.007	62.4S	72.1W	0			
1859	Mar	04	18:55	P 147	1.419	0.245	61.2N	178.9W	0			
1859	Jul	29	21:57	P 114	1.260	0.520	63.0N	16.0W	0			
1859	Aug	28	05:02	P 152	-1.257	0.525	61.5S	33.7E	0			
1860	Jan	23	00:27	A 119	-0.897	0.917	71.8S	117.1W	26	719	06m07s	
1860	Jul	18	14:26	T 124	0.549	1.050	52.5N	20.3W	56	198	03m39s	
1861	Jan	11	03:29	A 129	-0.177	0.966	31.8S	132.7E	80	123	03m30s	
1861	Jul	08	02:10	A 134	-0.223	0.998	10.0N	145.8E	77	7	00m14s	



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1861 Dec 31 13:49	T 139	0.519	1.019	7.8N	31.6W	59	74	01m55s
1862 Jun 27 06:42	P 144	-1.025	0.922	65.4S	60.8E		0	
1862 Nov 21 18:30	P 111	-1.505	0.058	68.8S	99.1E		0	
1862 Dec 21 04:53	P 149	1.163	0.701	66.0N	93.6E		0	
1863 May 17 17:01	P 116	1.063	0.860	69.2N	126.8E		0	
1863 Nov 11 08:09	A 121	-0.876	0.994	75.4S	15.2E	28	42	00m22s
1864 May 06 00:17	H 126	0.262	1.015	31.6N	171.5E	75	52	01m25s
1864 Oct 30 15:30	A 131	-0.182	0.951	24.3S	59.3W	79	181	05m41s
1865 Apr 25 14:08	T 136	-0.483	1.058	14.8S	25.8W	61	219	05m23s
1865 Oct 19 16:21	A 141	0.537	0.926	21.3N	60.2W	57	326	09m27s
1866 Mar 16 21:51	P 108	1.424	0.211	72.0N	129.1E		0	
1866 Apr 15 06:52	P 146	-1.185	0.663	71.4S	136.6E		0	
1866 Oct 08 16:44	P 151	1.230	0.569	71.9N	2.9W		0	
1867 Mar 06 09:47	A 118	0.772	0.979	42.4N	18.4E	39	118	01m57s
1867 Aug 29 13:13	T 123	-0.794	1.034	41.1S	34.9W	37	189	02m51s
1868 Feb 23 14:21	A 128	0.071	0.935	6.1S	33.0W	86	244	08m30s
1868 Aug 18 05:12	Tm 133	-0.044	1.076	10.6N	102.3E	88	245	06m47s
1869 Feb 11 13:47	A 138	-0.625	0.920	51.3S	9.7W	51	387	08m02s
1869 Aug 07 22:01	T 143	0.696	1.055	59.1N	133.2W	46	254	03m48s
1870 Jan 31 15:26	P 148	-1.283	0.478	69.9S	100.1E		0	
1870 Jun 28 23:47	P 115	-1.195	0.633	66.6S	169.4W		0	
1870 Jul 28 11:02	Pb 153	1.504	0.074	69.2N	170.9E		0	
1870 Dec 22 12:28	T 120	0.859	1.025	35.8N	1.5W	31	165	02m11s
1871 Jun 18 02:35	A 125	-0.455	0.948	3.5S	144.7E	63	214	07m14s
1871 Dec 12 04:04	T 130	0.184	1.047	12.7S	119.4E	79	157	04m23s
1872 Jun 06 03:20	A 135	0.309	0.959	40.5N	124.8E	72	157	04m20s
1872 Nov 30 18:30	H 140	-0.508	1.010	51.2S	111.8W	59	40	00m47s
1873 May 26 09:09	P 145	1.051	0.897	63.7N	99.7W		0	
1873 Nov 20 03:23	P 150	-1.262	0.513	63.2S	9.5W		0	
1874 Apr 16 14:01	T 117	-0.837	1.057	39.9S	0.9W	33	335	04m11s
1874 Oct 10 11:14	An 122	0.989	0.919	58.7N	72.1E	7	-	06m28s
1875 Apr 06 06:37	T 127	-0.129	1.055	0.2S	84.8E	83	182	04m37s
1875 Sep 29 12:58	A 132	0.243	0.966	10.0N	10.1W	76	127	03m36s
1876 Mar 25 20:05	A 137	0.614	1.000	34.8N	141.0W	52	1	00m01s
1876 Sep 17 21:49	T 142	-0.505	1.022	24.6S	164.4W	60	86	01m53s
1877 Mar 15 02:38	P 147	1.392	0.290	61.0N	56.6E		0	
1877 Aug 09 05:30	P 114	1.328	0.388	62.3N	138.5W		0	
1877 Sep 07 12:49	P 152	-1.199	0.637	61.2S	91.8W		0	
1878 Feb 02 08:28	A 119	-0.907	0.919	67.9S	122.4E	24	729	05m59s
1878 Jul 29 21:47	T 124	0.623	1.045	53.8N	124.0W	51	191	03m11s
1879 Jan 22 11:53	A 129	-0.182	0.970	29.8S	8.5E	79	110	03m03s
1879 Jul 19 09:05	Am 134	-0.144	0.994	13.0N	42.9E	82	20	00m39s
1880 Jan 11 22:34	T 139	0.514	1.021	8.3N	164.1W	59	84	02m07s
1880 Jul 07 13:11	A 144	-0.941	0.944	46.4S	33.4W	19	611	05m47s
1880 Dec 02 03:12	P 111	-1.517	0.037	67.8S	42.9W		0	
1880 Dec 31 13:45	P 149	1.159	0.709	65.0N	49.6W		0	
1881 May 27 23:49	P 116	1.135	0.737	68.2N	13.3E		0	
1881 Nov 21 16:31	A 121	-0.893	0.989	81.2S	114.5W	26	90	00m43s
1882 May 17 07:37	T 126	0.327	1.020	38.4N	61.6E	71	72	01m50s
1882 Nov 10 23:22	A 131	-0.206	0.947	29.2S	177.0W	78	201	06m14s
1883 May 06 21:54	T 136	-0.425	1.063	8.1S	144.6W	65	229	05m58s



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1883 Oct 30 23:51	A 141	0.503	0.924	15.6N	174.9W	60	331	10m17s
1884 Mar 27 06:02	P 108	1.460	0.143	72.0N	7.8W	0		
1884 Apr 25 14:46	P 146	-1.136	0.756	70.7S	4.6E	0		
1884 Oct 19 00:18	P 151	1.189	0.638	71.5N	130.1W	0		
1885 Mar 16 17:46	A 118	0.803	0.978	48.9N	106.1W	36	132	01m55s
1885 Sep 08 20:52	T 123	-0.849	1.033	49.6S	156.5W	32	211	02m31s
1886 Mar 05 22:05	A 128	0.097	0.936	0.5S	150.1W	84	241	08m20s
1886 Aug 29 12:55	T 133	-0.106	1.074	3.5N	15.3W	84	240	06m36s
1887 Feb 22 21:33	A 138	-0.604	0.923	45.7S	126.5W	53	362	08m01s
1887 Aug 19 05:32	T 143	0.631	1.052	50.6N	111.9E	51	221	03m50s
1888 Feb 11 23:38	P 148	-1.268	0.503	70.7S	35.7W	0		
1888 Jul 09 06:31	P 115	-1.280	0.483	67.6S	78.8E	0		
1888 Aug 07 18:06	P 153	1.437	0.198	70.1N	53.0E	0		
1889 Jan 01 21:17	T 120	0.860	1.026	36.7N	137.6W	30	175	02m17s
1889 Jun 28 09:00	A 125	-0.543	0.947	9.7S	47.3E	57	232	07m22s
1889 Dec 22 12:54	T 130	0.189	1.045	12.7S	12.8W	79	152	04m18s
1890 Jun 17 09:55	A 135	0.225	0.962	36.4N	29.3E	77	140	04m09s
1890 Dec 12 03:06	H 140	-0.501	1.006	52.8S	123.9E	60	24	00m28s
1891 Jun 06 16:16	A 145	0.975	0.998	74.6N	163.8E	12	33	00m06s
1891 Dec 01 11:31	P 150	-1.251	0.533	64.1S	141.0W	0		
1892 Apr 26 21:55	T 117	-0.887	1.059	42.5S	119.4W	27	414	04m19s
1892 Oct 20 18:36	P 122	1.029	0.904	61.4N	33.2W	0		
1893 Apr 16 14:36	T 127	-0.176	1.056	1.3N	34.6W	80	186	04m47s
1893 Oct 09 20:30	A 132	0.287	0.965	8.2N	123.0W	73	130	03m41s
1894 Apr 06 03:54	H 137	0.574	1.000	36.7N	102.4E	55	1	00m01s
1894 Sep 29 05:39	T 142	-0.457	1.023	26.1S	78.5E	63	86	01m55s
1895 Mar 26 10:10	P 147	1.356	0.352	61.0N	64.9W	0		
1895 Aug 20 13:09	P 114	1.391	0.265	61.8N	97.8E	0		
1895 Sep 18 20:44	P 152	-1.147	0.735	61.0S	140.6E	0		
1896 Feb 13 16:23	A 119	-0.922	0.922	64.6S	3.5E	22	761	05m48s
1896 Aug 09 05:09	T 124	0.696	1.039	54.4N	132.2E	46	182	02m43s
1897 Feb 01 20:15	A 129	-0.190	0.974	27.1S	115.7W	79	94	02m34s
1897 Jul 29 15:57	A 134	-0.064	0.990	15.3N	59.0W	86	35	01m05s
1898 Jan 22 07:19	T 139	0.508	1.024	9.5N	63.6E	59	96	02m21s
1898 Jul 18 19:37	A 144	-0.855	0.945	35.7S	130.1W	31	385	06m11s
1898 Dec 13 11:58	P 111	-1.525	0.023	66.8S	174.5E	0		
1899 Jan 11 22:38	P 149	1.156	0.715	64.0N	167.5E	0		
1899 Jun 08 06:34	P 116	1.209	0.608	67.2N	98.9W	0		
1899 Dec 03 00:57	A 121	-0.906	0.984	86.6S	121.5E	25	140	01m01s
1900 May 28 14:54	T 126	0.394	1.025	44.8N	46.5W	67	92	02m10s
1900 Nov 22 07:20	A 131	-0.224	0.942	33.1S	64.8E	77	220	06m42s



LUNAR ECLIPSES 1801-1900

During the 19th century, the Moon will experience 249 lunar eclipses. These events can be broken down into the following categories:

Penumbral	=	89	35.7%
Partial	=	97	39.0%
Total	=	63	25.3%

Local circumstances at greatest eclipse²⁰² for every event during the 19th century are presented in the following table. The date and Universal Time of the instant of greatest eclipse are found in the first two columns. The eclipse type is given (T=Total, P=Partial [Umbral], or P=Penumbral) along with the Saros series. The penumbral and umbral magnitudes of the eclipse are defined as the fractions of the Moon's diameter obscured by each shadow at greatest eclipse. The semi-durations of the partial and total phases of the eclipse follow. Finally, the Greenwich Siderial Time at midnight, the Moon's Geocentric Right Ascension and Declination at greatest eclipse complete each record.

Column	Heading	Definition/Description
1	Date	Calendar Date (Gregorian) at instant of Greatest Eclipse. (Julian calendar is used before 1584 Oct 15).
2	Greatest Eclipse	Time (UT) of Greatest Eclipse, which is defined as the instant when Moon passes closest to the axis of Earth's shadows.
3	Typ	Type of lunar eclipse where: N = Penumbral Eclipse. P = Partial (Umbral) Eclipse. T = Total (Umbral) Eclipse. (Tc = central total eclipse) If the Type ends with: "m" = Middle eclipse of Saros series. "+" = Central eclipse (Moon north of axis). "-" = Central eclipse (Moon south of axis).
4	Saros	Saros series of eclipse.
5	Gamma	Distance of the Moon from the axis of Earth's shadow cone (units of equatorial radii) at the instant of greatest eclipse.
6	Pen. Mag.	Penumbral eclipse magnitude is the fraction of the Moon's diameter obscured by the penumbra.

²⁰². Greatest eclipse is defined as the instant when the Moon passes closest to the axis of Earth's shadow. This marks the instant when the Moon is deepest in Earth's shadow(s).



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- 7 Umb. Umbral eclipse magnitude is the fraction of
Mag. the Moon's diameter obscured by the umbra.
- 8 Par. Semi-duration of partial (umbral) eclipse (minutes).
SDur
- 9 Total Semi-duration of total (umbral) eclipse (minutes).
SDur 10 GST0 Greenwich Siderial Time at 00:00 U.T..
- 11 Moon Geocentric Right Ascension of the Moon
RA at greatest eclipse.
- 12 Moon Geocentric Declination of the Moon
Dec at greatest eclipse.

Local Circumstances at Greatest Eclipse: 1801 - 1900

			Saros		Pen.		Umb.		Par.Total			Moon Moon	
Date	U.T.	Type	#	Gamma	Mag.	Mag.	SDur	SDur	GST0	RA	Dec		
1801 Mar 30 05:24	T-	119		0.006	2.882	1.845	111m	51m	12.5	12.55	-3.6		
1801 Sep 22 07:19	T+	124		-0.107	2.680	1.672	109m	49m	0.0	23.93	-0.6		
1802 Mar 19 11:15	U	129		-0.752	1.542	0.447	76m	-	11.8	11.87	0.1		
1802 Sep 11 22:36	U	134		0.610	1.738	0.768	85m	-	23.3	23.27	-4.0		
1803 Feb 6 17:10	P	101		1.532	0.118	-0.994	-	-	9.1	9.34	17.0		
1803 Mar 8 11:17	P	139		-1.465	0.243	-0.873	-	-	11.0	11.16	4.0		
1803 Aug 3 07:05	P	106		-1.235	0.604	-0.390	-	-	20.7	20.86	-18.9		
1803 Sep 1 15:19	P9	-		22.7	22.61	-7.3							
1804 Jan 26 21:21	U	111		0.788	1.457	0.397	69m	-	8.3	8.56	19.5		
1804 Jul 22 17:38	U	116		-0.514	1.954	0.906	98m	-	20.0	20.13	-20.7		
1805 Jan 15 08:41	T-	121		0.066	2.756	1.747	107m	49m	7.6	7.79	21.2		
1805 Jul 11 21:05	T-	126		0.256	2.448	1.360	114m	44m	19.3	19.37	-21.9		
1806 Jan 5 00:02	U	131		-0.598	1.771	0.781	86m	-	6.9	7.01	22.1		
1806 Jun 30 21:44	P	136		1.011	1.058	-0.023	-	-	18.6	18.59	-22.3		
1806 Nov 26 02:05	P	103		1.485	0.170	-0.875	-	-	4.3	4.07	22.2		
1806 Dec 25 14:48	P	141		-1.289	0.518	-0.501	-	-	6.2	6.22	22.2		
1807 May 21 16:49	U	108		-0.942	1.148	0.140	42m	-	15.9	15.82	-21.0		
1807 Nov 15 08:10	U	113		0.848	1.368	0.269	61m	-	3.6	3.30	19.1		
1808 May 10 07:38	T+	118		-0.174	2.539	1.569	105m	47m	15.2	15.13	-17.8		
1808 Nov 3 08:13	T-	123		0.161	2.638	1.519	116m	49m	2.8	2.55	15.2		
1809 Apr 30 00:33	U	128		0.549	1.853	0.879	90m	-	14.5	14.46	-14.0		
1809 Oct 23 09:02	U	133		-0.544	1.919	0.832	97m	-	2.1	1.84	10.8		
1810 Mar 21 02:54	P	100		-1.421	0.294	-0.763	-	-	11.9	11.96	-1.2		
1810 Apr 19 14:54	P	138		1.316	0.467	-0.551	-	-	13.8	13.81	-9.8		
1810 Sep 13 06:27	P	105		1.430	0.245	-0.747	-	-	23.4	23.34	-2.7		
1810 Oct 12 16:39	P	143		-1.223	0.642	-0.383	-	-	1.4	1.17	6.2		
1811 Mar 10 06:37	U	110		-0.753	1.546	0.438	76m	-	11.1	11.30	3.8		
1811 Sep 2 22:42	U	115		0.697	1.577	0.610	78m	-	22.7	22.72	-7.3		
1812 Feb 27 06:05	T+	120		-0.054	2.832	1.718	117m	52m	10.4	10.62	8.7		



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1812	Aug	22	15:01	Tm	125	-0.023	2.825	1.838	108m	51m	22.1	22.09	-11.8
1813	Feb	15	08:50	U	130	0.645	1.726	0.654	87m	-	9.7	9.92	13.3
1813	Aug	12	02:53	U	135	-0.808	1.409	0.371	68m	-	21.3	21.44	-15.9
1814	Jan	6	07:28	P	102	-1.412	0.282	-0.717	-	-	7.0	7.11	21.1
1814	Feb	4	18:47	P	140	1.293	0.510	-0.506	-	-	9.0	9.21	17.5
1814	Jul	2	16:51	P	107	1.223	0.675	-0.415	-	-	18.7	18.73	-22.0
1814	Dec	26	23:08	U	112	-0.757	1.482	0.488	71m	-	6.3	6.34	22.6
1815	Jun	21	18:06	T	117	0.450	2.083	1.013	104m	9m	17.9	17.96	-23.1
1815	Dec	16	12:55	T+	122	-0.091	2.724	1.690	109m	50m	5.6	5.55	23.2
1816	Jun	10	01:14	T	127	-0.337	2.264	1.247	105m	36m	17.2	17.20	-23.3
1816	Dec	4	20:35	U	132	0.632	1.760	0.669	89m	-	4.9	4.74	22.9
1817	May	1	07:44	P	99	1.459	0.180	-0.787	-	-	14.6	14.58	-13.6
1817	May	30	15:07	P	137	-1.061	0.913	-0.059	-	-	16.5	16.45	-22.8
1817	Nov	23	21:27	P	142	1.343	0.471	-0.653	-	-	4.2	3.92	21.6
1818	Apr	21	00:20	U	109	0.773	1.447	0.463	70m	-	13.9	13.90	-10.9
1818	Oct	14	05:25	U	114	-0.918	1.224	0.156	46m	-	1.5	1.27	7.2
1819	Apr	10	13:08	T-	119	0.050	2.800	1.762	112m	51m	13.2	13.22	-7.7
1819	Oct	3	15:13	Tm	124	-0.151	2.600	1.592	108m	48m	0.8	0.59	3.7
1820	Mar	29	18:42	U	129	-0.711	1.616	0.522	82m	-	12.5	12.53	-4.1
1820	Sep	22	06:35	U	134	0.561	1.830	0.857	89m	-	0.1	23.93	0.2
1821	Feb	17	01:05	P	101	1.547	0.089	-1.018	-	-	9.8	10.06	13.4
1821	Mar	18	18:45	P	139	-1.429	0.308	-0.805	-	-	11.7	11.83	-0.3
1821	Aug	13	14:26	P	106	-1.307	0.475	-0.524	-	-	21.4	21.56	-15.9
1821	Sep	11	23:05	P	144	1.277	0.522	-0.461	-	-	23.4	23.27	-3.3
1822	Feb	6	05:43	U	111	0.796	1.440	0.384	68m	-	9.1	9.31	16.5
1822	Aug	3	00:30	U	116	-0.594	1.810	0.758	92m	-	20.7	20.85	-18.3
1823	Jan	26	17:25	T-	121	0.073	2.742	1.737	107m	49m	8.3	8.56	18.9
1823	Jul	23	03:32	T-	126	0.170	2.607	1.517	116m	50m	20.0	20.10	-20.1
1824	Jan	16	08:54	U	131	-0.594	1.779	0.788	86m	-	7.6	7.80	20.5
1824	Jul	11	04:15	U	136	0.924	1.217	0.138	45m	-	19.3	19.34	-21.3
1824	Dec	6	10:32	P	103	1.498	0.150	-0.900	-	-	5.0	4.86	24.0
1825	Jan	4	23:32	P	141	-1.289	0.519	-0.503	-	-	7.0	7.03	21.4
1825	Jun	1	00:06	U	108	-1.009	1.023	0.020	16m	-	16.6	16.56	-23.0
1825	Nov	25	16:09	U	113	0.864	1.340	0.235	57m	-	4.3	4.07	21.6
1826	May	21	15:15	T+	118	-0.239	2.419	1.452	104m	44m	15.9	15.85	-20.4
1826	Nov	14	15:56	T-	123	0.184	2.597	1.475	116m	48m	3.5	3.29	18.4
1827	May	11	08:17	U	128	0.491	1.959	0.986	94m	-	15.2	15.16	-17.2
1827	Nov	3	16:52	U	133	-0.515	1.972	0.885	99m	-	2.8	2.55	14.5
1828	Mar	31	10:39	P	100	-1.463	0.217	-0.840	-	-	12.6	12.63	-5.6
1828	Apr	29	22:28	P	138	1.267	0.557	-0.462	-	-	14.5	14.49	-13.5
1828	Sep	23	14:19	P	105	1.473	0.167	-0.825	-	-	0.2	24.00	1.6
1828	Oct	23	00:44	P	143	-1.189	0.705	-0.321	-	-	2.1	1.86	10.2
1829	Mar	20	14:08	U	110	-0.789	1.479	0.372	71m	-	11.9	11.97	-0.6
1829	Sep	13	06:33	U	115	0.751	1.479	0.510	72m	-	23.5	23.38	-3.2
1830	Mar	9	13:43	T+	120	-0.083	2.777	1.667	117m	52m	11.1	11.30	4.5
1830	Sep	2	22:38	T-	125	0.037	2.801	1.809	108m	50m	22.8	22.76	-7.8
1831	Feb	26	16:56	U	130	0.624	1.761	0.695	89m	-	10.4	10.62	9.4
1831	Aug	23	10:00	U	135	-0.743	1.532	0.489	77m	-	22.1	22.12	-12.3
1832	Jan	17	16:18	P	102	-1.414	0.278	-0.719	-	-	7.7	7.90	19.4
1832	Feb	16	03:21	P	140	1.278	0.534	-0.478	-	-	9.7	9.94	13.9
1832	Jul	12	23:16	P	107	1.308	0.519	-0.573	-	-	19.4	19.47	-20.7



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1832	Aug	11	14:15	Pb	145	-1.540	0.092	-0.995	-	-	21.3	21.44	-16.6
1833	Jan	6	08:00	U	112	-0.761	1.474	0.479	71m	-	7.0	7.15	21.7
1833	Jul	2	00:43	U	117	0.533	1.929	0.862	98m	-	18.7	18.71	-22.6
1833	Dec	26	21:33	T+	122	-0.095	2.717	1.680	109m	49m	6.3	6.36	23.3
1834	Jun	21	08:20	T+	127	-0.258	2.406	1.393	107m	43m	17.9	17.96	-23.7
1834	Dec	16	04:48	U	132	0.625	1.775	0.680	90m	-	5.6	5.54	23.9
1835	May	12	15:29	Pe	99	1.516	0.074	-0.891	-	-	15.3	15.29	-16.6
1835	Jun	10	22:36	U	137	-0.989	1.043	0.074	30m	-	17.2	17.21	-24.0
1835	Dec	5	05:20	P	142	1.329	0.498	-0.628	-	-	4.9	4.71	23.5
1836	May	1	08:07	U	109	0.830	1.342	0.358	63m	-	14.6	14.59	-14.4
1836	Oct	24	13:15	U	114	-0.947	1.169	0.101	37m	-	2.2	1.96	11.1
1837	Apr	20	20:41	T-	119	0.104	2.702	1.665	112m	50m	13.9	13.90	-11.6
1837	Oct	13	23:17	T+	124	-0.188	2.532	1.524	107m	46m	1.5	1.26	7.8
1838	Apr	10	01:59	U	129	-0.662	1.705	0.613	87m	-	13.2	13.20	-8.3
1838	Oct	3	14:41	U	134	0.518	1.910	0.935	91m	-	0.8	0.59	4.4
1839	Feb	28	08:54	Pe	101	1.567	0.049	-1.053	-	-	10.5	10.76	9.4
1839	Mar	30	02:03	P	139	-1.385	0.386	-0.722	-	-	12.5	12.49	-4.5
1839	Aug	24	21:52	P	106	-1.375	0.353	-0.651	-	-	22.2	22.24	-12.3
1839	Sep	23	06:57	P	144	1.231	0.608	-0.380	-	-	0.1	23.93	0.9
1840	Feb	17	14:02	U	111	0.808	1.417	0.366	67m	-	9.8	10.04	12.9
1840	Aug	13	07:23	U	116	-0.672	1.670	0.612	85m	-	21.5	21.55	-15.2
1841	Feb	6	02:07	T-	121	0.081	2.725	1.723	107m	49m	9.1	9.31	15.8
1841	Aug	2	10:01	T-	126	0.084	2.764	1.673	118m	53m	20.7	20.82	-17.7
1842	Jan	26	17:44	U	131	-0.588	1.788	0.799	86m	-	8.4	8.57	18.1
1842	Jul	22	10:47	U	136	0.838	1.374	0.297	64m	-	20.0	20.07	-19.6
1842	Dec	17	19:02	P	103	1.508	0.134	-0.920	-	-	5.7	5.68	24.8
1843	Jan	16	08:14	P	141	-1.289	0.521	-0.503	-	-	7.7	7.81	19.8
1843	Jun	12	07:22	P	108	-1.077	0.897	-0.102	-	-	17.3	17.32	-24.2
1843	Jul	11	16:50	Pb	146	1.547	0.048	-0.978	-	-	19.3	19.32	-20.7
1843	Dec	7	00:11	U	113	0.879	1.316	0.207	54m	-	5.0	4.86	23.3
1844	May	31	22:51	T	118	-0.305	2.295	1.331	102m	39m	16.6	16.59	-22.4
1844	Nov	24	23:45	T-	123	0.203	2.564	1.440	115m	47m	4.3	4.05	20.9
1845	May	21	15:54	T	128	0.428	2.074	1.102	97m	23m	15.9	15.89	-19.8
1845	Nov	14	00:50	U	133	-0.492	2.013	0.927	100m	-	3.5	3.28	17.7
1846	Apr	11	18:11	P	100	-1.513	0.125	-0.932	-	-	13.3	13.29	-9.7
1846	May	11	05:54	P	138	1.211	0.661	-0.359	-	-	15.2	15.19	-16.6
1846	Oct	4	22:21	P	105	1.508	0.103	-0.890	-	-	0.9	0.66	5.9
1846	Nov	3	08:59	P	143	-1.162	0.754	-0.271	-	-	2.8	2.56	13.9
1847	Mar	31	21:27	U	110	-0.835	1.394	0.290	64m	-	12.6	12.63	-4.9
1847	Sep	24	14:34	U	115	0.797	1.396	0.424	67m	-	0.2	0.04	1.1
1848	Mar	19	21:12	T+	120	-0.119	2.708	1.604	116m	51m	11.8	11.96	0.1
1848	Sep	13	06:19	T-	125	0.092	2.703	1.705	108m	50m	23.5	23.42	-3.7
1849	Mar	9	00:56	U	130	0.598	1.806	0.747	91m	-	11.1	11.30	5.1
1849	Sep	2	17:10	U	135	-0.681	1.650	0.600	84m	-	22.8	22.79	-8.4
1850	Jan	28	01:06	P	102	-1.418	0.269	-0.725	-	-	8.5	8.67	16.9
1850	Feb	26	11:48	P	140	1.259	0.567	-0.440	-	-	10.4	10.64	9.9
1850	Jul	24	05:40	P	107	1.393	0.363	-0.729	-	-	20.1	20.20	-18.7
1850	Aug	22	20:55	P	145	-1.468	0.226	-0.866	-	-	22.1	22.12	-13.0
1851	Jan	17	16:51	U	112	-0.766	1.466	0.470	70m	-	7.8	7.94	20.0
1851	Jul	13	07:22	U	117	0.616	1.776	0.712	92m	-	19.4	19.46	-21.4
1852	Jan	7	06:11	T+	122	-0.099	2.712	1.671	109m	49m	7.1	7.17	22.4



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1852	Jul	1	15:26	T+	127	-0.180	2.548	1.539	109m	48m	18.7	18.71	-23.3
1852	Dec	26	13:03	U	132	0.620	1.785	0.686	90m	-	6.3	6.36	23.9
1853	Jun	21	06:02	U	137	-0.914	1.179	0.212	49m	-	18.0	17.97	-24.4
1853	Dec	15	13:19	P	142	1.319	0.518	-0.609	-	-	5.6	5.52	24.5
1854	May	12	15:46	U	109	0.892	1.228	0.244	53m	-	15.3	15.30	-17.3
1854	Nov	4	21:13	U	114	-0.971	1.126	0.058	28m	-	2.9	2.67	14.7
1855	May	2	04:05	T-	119	0.163	2.594	1.556	111m	49m	14.6	14.59	-15.1
1855	Oct	25	07:29	T+	124	-0.218	2.478	1.470	106m	45m	2.2	1.95	11.8
1856	Apr	20	09:07	U	129	-0.607	1.806	0.715	93m	-	13.9	13.87	-12.1
1856	Oct	13	22:54	T	134	0.481	1.980	1.002	93m	3m	1.5	1.26	8.6
1857	Apr	9	09:13	P	139	-1.335	0.477	-0.627	-	-	13.2	13.16	-8.7
1857	Sep	4	05:22	P	106	-1.438	0.240	-0.769	-	-	22.9	22.91	-8.5
1857	Oct	3	14:57	P	144	1.191	0.684	-0.309	-	-	0.8	0.59	5.1
1858	Feb	27	22:14	U	111	0.825	1.381	0.336	64m	-	10.5	10.74	8.9
1858	Aug	24	14:21	U	116	-0.745	1.539	0.476	77m	-	22.2	22.23	-11.7
1859	Feb	17	10:43	T-	121	0.095	2.698	1.700	106m	49m	9.8	10.03	12.2
1859	Aug	13	16:34	Tm	126	0.004	2.914	1.820	118m	54m	21.4	21.52	-14.7
1860	Feb	7	02:30	U	131	-0.579	1.805	0.816	87m	-	9.1	9.32	15.0
1860	Aug	1	17:25	U	136	0.755	1.526	0.450	77m	-	20.7	20.79	-17.2
1860	Dec	28	03:34	P	103	1.516	0.121	-0.937	-	-	6.5	6.50	24.7
1861	Jan	26	16:54	P	141	-1.287	0.525	-0.500	-	-	8.4	8.58	17.4
1861	Jun	22	14:35	P	108	-1.148	0.765	-0.230	-	-	18.1	18.09	-24.6
1861	Jul	21	23:50	P	146	1.466	0.195	-0.828	-	-	20.0	20.05	-19.0
1861	Dec	17	08:19	U	113	0.888	1.300	0.188	52m	-	5.7	5.67	24.2
1862	Jun	12	06:21	T	118	-0.376	2.164	1.202	99m	32m	17.4	17.35	-23.5
1862	Dec	6	07:40	T-	123	0.216	2.541	1.416	115m	46m	5.0	4.84	22.7
1863	Jun	1	23:26	T	128	0.361	2.198	1.225	100m	34m	16.7	16.62	-21.7
1863	Nov	25	08:56	U	133	-0.476	2.043	0.957	101m	-	4.3	4.04	20.3
1864	May	21	13:12	P	138	1.150	0.773	-0.248	-	-	16.0	15.91	-19.2
1864	Oct	15	06:31	P	105	1.538	0.048	-0.946	-	-	1.6	1.34	10.1
1864	Nov	13	17:21	P	143	-1.140	0.794	-0.231	-	-	3.5	3.29	17.1
1865	Apr	11	04:38	U	110	-0.886	1.300	0.197	53m	-	13.3	13.30	-9.1
1865	Oct	4	22:40	U	115	0.839	1.322	0.346	61m	-	0.9	0.70	5.4
1866	Mar	31	04:33	T+	120	-0.161	2.627	1.528	116m	49m	12.6	12.62	-4.2
1866	Sep	24	14:07	T-	125	0.141	2.616	1.613	108m	48m	0.2	0.08	0.6
1867	Mar	20	08:49	U	130	0.566	1.862	0.809	93m	-	11.8	11.97	0.8
1867	Sep	14	00:26	U	135	-0.624	1.757	0.701	89m	-	23.5	23.44	-4.2
1868	Feb	8	09:50	P	102	-1.425	0.254	-0.738	-	-	9.2	9.40	13.7
1868	Mar	8	20:10	P	140	1.234	0.610	-0.392	-	-	11.1	11.32	5.7
1868	Aug	3	12:09	P	107	1.474	0.215	-0.878	-	-	20.8	20.90	-16.1
1868	Sep	2	03:41	P	145	-1.401	0.350	-0.745	-	-	22.8	22.79	-9.1
1869	Jan	28	01:38	U	112	-0.773	1.452	0.456	69m	-	8.5	8.70	17.4
1869	Jul	23	14:03	U	117	0.696	1.627	0.564	83m	-	20.1	20.19	-19.4
1870	Jan	17	14:46	T+	122	-0.104	2.704	1.661	110m	49m	7.8	7.96	20.6
1870	Jul	12	22:34	T+	127	-0.102	2.689	1.683	110m	50m	19.4	19.46	-22.0
1871	Jan	6	21:17	U	132	0.615	1.795	0.694	91m	-	7.1	7.17	23.0
1871	Jul	2	13:28	U	137	-0.840	1.314	0.349	62m	-	18.7	18.74	-23.9
1871	Dec	26	21:19	P	142	1.310	0.533	-0.595	-	-	6.3	6.34	24.5
1872	May	22	23:18	U	109	0.959	1.105	0.121	38m	-	16.1	16.02	-19.7
1872	Nov	15	05:20	U	114	-0.988	1.095	0.028	19m	-	3.6	3.41	17.7
1873	May	12	11:20	T-	119	0.229	2.474	1.434	110m	45m	15.4	15.29	-18.0



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1873	Nov	4	15:51	T+	124	-0.241	2.436	1.427	105m	43m	2.9	2.67	15.3
1874	May	1	16:03	U	129	-0.542	1.923	0.833	98m	-	14.6	14.56	-15.6
1874	Oct	25	07:16	T	134	0.451	2.036	1.056	95m	17m	2.2	1.96	12.5
1875	Apr	20	16:15	P	139	-1.277	0.580	-0.519	-	-	13.9	13.84	-12.6
1875	Sep	15	12:58	P	106	-1.496	0.137	-0.878	-	-	23.6	23.57	-4.4
1875	Oct	14	23:03	P	144	1.158	0.748	-0.250	-	-	1.5	1.27	9.3
1876	Mar	10	06:22	U	111	0.848	1.338	0.299	60m	-	11.2	11.42	4.7
1876	Sep	3	21:23	U	116	-0.813	1.416	0.347	67m	-	22.9	22.90	-7.9
1877	Feb	27	19:16	T-	121	0.112	2.664	1.670	106m	48m	10.5	10.73	8.2
1877	Aug	23	23:12	T+	126	-0.074	2.787	1.689	118m	53m	22.2	22.20	-11.2
1878	Feb	17	11:11	U	131	-0.567	1.827	0.839	88m	-	9.8	10.04	11.4
1878	Aug	13	00:08	U	136	0.676	1.672	0.596	86m	-	21.4	21.48	-14.2
1879	Jan	8	12:04	P	103	1.524	0.107	-0.954	-	-	7.2	7.32	23.7
1879	Feb	7	01:29	P	141	-1.281	0.536	-0.490	-	-	9.1	9.32	14.3
1879	Jul	3	21:51	P	108	-1.217	0.636	-0.356	-	-	18.8	18.85	-24.1
1879	Aug	2	06:58	P	146	1.389	0.335	-0.686	-	-	20.7	20.77	-16.6
1879	Dec	28	16:26	U	113	0.897	1.285	0.171	49m	-	6.5	6.49	24.1
1880	Jun	22	13:50	T	118	-0.448	2.030	1.070	96m	19m	18.1	18.11	-23.9
1880	Dec	16	15:39	T-	123	0.226	2.521	1.396	115m	45m	5.7	5.65	23.6
1881	Jun	12	06:54	T	128	0.290	2.328	1.355	103m	40m	17.4	17.37	-22.9
1881	Dec	5	17:09	U	133	-0.464	2.065	0.980	101m	-	5.0	4.83	22.0
1882	Jun	1	20:22	P	138	1.083	0.897	-0.126	-	-	16.7	16.64	-21.1
1882	Nov	25	01:51	P	143	-1.124	0.823	-0.202	-	-	4.3	4.05	19.6
1883	Apr	22	11:39	U	110	-0.945	1.190	0.090	37m	-	14.0	13.97	-13.0
1883	Oct	16	06:54	U	115	0.873	1.260	0.281	56m	-	1.6	1.37	9.6
1884	Apr	10	11:47	T+	120	-0.212	2.533	1.438	114m	47m	13.3	13.29	-8.4
1884	Oct	4	22:02	T-	125	0.184	2.540	1.531	107m	47m	0.9	0.74	4.9
1885	Mar	30	16:34	U	130	0.526	1.932	0.886	96m	-	12.5	12.63	-3.5
1885	Sep	24	07:48	U	135	-0.573	1.854	0.792	94m	-	0.2	0.10	0.1
1886	Feb	18	18:29	P	102	-1.437	0.231	-0.757	-	-	9.9	10.12	10.0
1886	Mar	20	04:24	P	140	1.203	0.665	-0.332	-	-	11.8	11.99	1.3
1886	Aug	14	18:42	Pe	107	1.551	0.075	-1.020	-	-	21.5	21.59	-12.9
1886	Sep	13	10:35	P	145	-1.340	0.465	-0.635	-	-	23.5	23.44	-4.9
1887	Feb	8	10:22	U	112	-0.784	1.433	0.437	68m	-	9.2	9.44	14.2
1887	Aug	3	20:49	U	117	0.773	1.485	0.424	74m	-	20.8	20.90	-16.7
1888	Jan	28	23:20	T+	122	-0.110	2.695	1.650	110m	49m	8.5	8.73	18.0
1888	Jul	23	05:45	T+	127	-0.026	2.828	1.824	110m	51m	20.1	20.20	-20.0
1889	Jan	17	05:30	U	132	0.611	1.805	0.702	91m	-	7.8	7.97	21.3
1889	Jul	12	20:54	U	137	-0.765	1.451	0.487	71m	-	19.4	19.49	-22.6
1890	Jan	6	05:21	P	142	1.303	0.547	-0.581	-	-	7.0	7.15	23.7
1890	Jun	3	06:45	P	109	1.031	0.974	-0.011	-	-	16.8	16.76	-21.3
1890	Jul	2	14:09	P	147	-1.487	0.127	-0.838	-	-	18.7	18.77	-24.5
1890	Nov	26	13:34	U	114	-0.999	1.073	0.007	9m	-	4.4	4.17	20.1
1891	May	23	18:29	T	119	0.299	2.345	1.305	108m	40m	16.1	16.02	-20.4
1891	Nov	16	00:19	T+	124	-0.259	2.402	1.393	104m	42m	3.7	3.41	18.4
1892	May	11	22:53	U	129	-0.473	2.050	0.960	103m	-	15.3	15.27	-18.6
1892	Nov	4	15:45	T	134	0.427	2.082	1.099	96m	23m	3.0	2.67	16.1
1893	Apr	30	23:09	P	139	-1.212	0.698	-0.397	-	-	14.6	14.53	-16.1
1893	Sep	25	20:39	Pe	106	-1.548	0.045	-0.977	-	-	0.3	0.23	-0.1
1893	Oct	25	07:16	P	144	1.131	0.801	-0.203	-	-	2.3	1.96	13.2
1894	Mar	21	14:21	U	111	0.877	1.280	0.248	55m	-	11.9	12.09	0.4



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1894	Sep	15	04:31	U	116	-0.875	1.306	0.231	56m	-	23.6	23.56	-3.8
1895	Mar	11	03:39	T-	121	0.138	2.615	1.626	106m	48m	11.2	11.41	4.0
1895	Sep	4	05:57	T+	126	-0.145	2.658	1.558	117m	51m	22.9	22.86	-7.4
1896	Feb	28	19:46	U	131	-0.549	1.859	0.873	89m	-	10.5	10.74	7.4
1896	Aug	23	06:57	U	136	0.600	1.811	0.735	93m	-	22.1	22.16	-10.8
1897	Jan	18	20:33	P	103	1.533	0.092	-0.971	-	-	7.9	8.11	21.7
1897	Feb	17	09:58	P	141	-1.272	0.554	-0.474	-	-	9.8	10.04	10.7
1897	Jul	14	05:05	P	108	-1.288	0.504	-0.485	-	-	19.5	19.61	-22.9
1897	Aug	12	14:09	P	146	1.314	0.473	-0.546	-	-	21.4	21.46	-13.6
1898	Jan	8	00:35	U	113	0.905	1.272	0.156	47m	-	7.2	7.30	23.1
1898	Jul	3	21:17	U	118	-0.523	1.893	0.934	92m	-	18.8	18.87	-23.4
1898	Dec	27	23:42	T-	123	0.234	2.507	1.382	114m	45m	6.4	6.46	23.5
1899	Jun	23	14:18	T-	128	0.217	2.463	1.488	105m	45m	18.1	18.13	-23.2
1899	Dec	17	01:26	U	133	-0.455	2.080	0.997	101m	-	5.7	5.63	22.9
1900	Jun	13	03:28	U	138	1.013	1.026	0.001	4m	-	17.4	17.39	-22.2
1900	Dec	6	10:26	P	143	-1.113	0.844	-0.180	-	-	5.0	4.84	21.4