PROCEEDINGS

OF THE

BOSTON SOCIETY OF NATURAL HISTORY.

TAKEN FROM THE SOCIETY'S RECORDS.

January 5, 1859.

T. J. Whittemore, Esq., in the Chair.

Mr. F. H. Storer read a paper on the power possessed by the larvæ of various common flies, of consuming, without apparent injury to themselves, the flesh of animals which have died from the effects of arsenic.

Last June he found several larvæ upon the liver of a subject in whose stomach he had previously detected the presence of arsenic; this liver was found on analysis to be saturated with arsenic. In order to determine if the larvæ were actually nourished by such poisonous flesh, the bodies of several rats killed by arsenious acid were exposed to the flies; in forty-eight hours they were completely fly-blown, and in a week all the flesh had been consumed by the larvæ; after this they changed into chrysalids. These chrysalids on analysis yielded metallic arsenic. It might be supposed that the arsenic, thus obtained, had been attracted mechanically to the external surface of the larvæ, and had not been swallowed, especially as the denuded bones were covered with a white

powder resembling arsenic—however this may be, the larvæ must either instinctively reject the poison, or it is excreted by them after ingestion. A number of these chrysalids were kept, in order to ascertain if they would undergo metamorphosis, and, if so, whether the perfect insects would be healthy and vigorous; some were kept two months, at the end of which time they were accidentally lost, undergoing no change, remaining however in a perfect state of preservation and full of pulp; a number of small flies, apparently not ichneumons, which gained access to them, died almost immediately, as was supposed from having fed upon them—the empty shells of other chrysalids found about the room showed that some had been metamorphosed, as none but the arsenically-fed larvæ had been admitted to the apartment. Experiments made to determine how large a quantity of arsenic might be contained in flesh without rendering it unfit for the food of these larvæ, were not very satisfactory, from the hardening of the tissue by solutions of this substance preventing the deposition of the eggs; eggs developed in such tissue bring forth living worms, which in his experiments died in six or eight hours. The adult flies perished in great numbers, while depositing the eggs upon the poisoned flesh. Jaeger (quoted by Orfila, Toxicologie I. 379) alludes to the fact that larvæ of flies live a little longer than the perfect insects, when arsenious acid is introduced into the digestive organs or applied to their external soft parts. Under favorable moist conditions, the larvæ lived three or four days, and were evidently nearly ready to pass into the chrysalid state. Experiments with arsenic acid, used however in too concentrated a state, also showed that there is a limit to the amount of arsenic which these larvæ can support.

He was inclined to believe that they can eat with impunity any flesh into which arsenic has been carried by vital processes, from the fact of their being found upon the arsenicated liver, an organ capable of absorbing a very large quantity of this poison; anatomical preparations, injected thoroughly with arsenic acid, have been found completely riddled and alive with larvæ.

This matter is important to chemists occupied in judicial investigations, who should not infer that a fly-blown organ can contain no arsenic; though if flies die almost immediately after alighting on a suspected substance, arsenic is probably present, and should

be specially sought for. These facts are also interesting as showing the great differences which exist in animals in their several conditions of metamorphosis, and as indicating the caution with which the results of experiments on one species should be received as applying to other species. The popular belief that a body, dead from the effects of arsenic, must of necessity be preserved from decay for an indefinite length of time, is unquestionably an error; in many cases of murder or suicide, where a great amount of the poison is administered, portions of or even the whole body may be preserved for a long time; but the few grains, which it is admitted are enough to cause death, cannot preserve from decay so large a mass as a human body. That a small, though fatal, dose will not prevent decomposition, is well known to all who have ever had poisoned rats die in the walls of their houses.

Mr. Putnam exhibited specimens of the young of *Pomotis vulgaris*, *P. appendix*, and *P. rubricauda*, and showed that the specimens presented by Mr. Thoreau, at the last meeting, were not the young of any of these species; but by having teeth on the palatines they were generically distinct, and belonged to the genus *Bryttus* of Valenciennes. He thought that they might prove to be the *Pomotis obesus* of Girard; but owing to the very short description given by Mr. Girard in the 5th volume of the Proceedings of the Society, it will be impossible to decide this question until we have an opportunity of seeing his original specimens. He mentioned that there were specimens of the same species from Philadelphia, at the museum at Cambridge, and that he had also received specimens from several localities near Salem, from Dr. R. H. Wheatland, and that it was very nearly allied to the *Bryttus fasciatus* of Dr. Holbrook. He also exhibited specimens of the young and adult pickerel, to show that the "short-nosed pickerel" is specifically distinct from the "long-nosed"—the *Esox reticulatus*—and said that the "short-nosed" species is the *Esox fasciatus* of Dekay, which is not the young of the *Esox reticulatus*, as Dr. Storer considers it, and that the *Esox ornatus* of Girard, which is adopted by Dr. Storer in his last number of the "Fishes of Massachusetts," is synonymous with the *Esox fasciatus* of Dekay; and therefore Girard's name would have to be dropped, and the name of *Esox fasciatus*, Dekay, would have to

be retained for the "short-nosed species." He mentioned that at the Cambridge Museum there are specimens of the "short-nosed species" which are about two feet in length, thus showing that it is not the young of the *E. reticulatus*,—which was also proved by the series of specimens exhibited from the Essex Institute, which showed the same marked differences in the very young as well as in the older specimens. In conclusion he mentioned that our fresh-water fishes are as yet but little known, and that there are in the waters of the United States at least forty-five species of the old genus Pomotis, and ten or fifteen of the genus Esox, of which very few have been described.

Mr. Sprague exhibited specimens of large size, presented by him several years ago, confirming the opinion of Mr. Putnam.

Capt. Atwood presented a specimen of *Naucrates*, or pilot fish, well known to seamen as accompanying their vessels for long distances; this was caught in a mackerel net in Provincetown harbor in October, 1858, and was the first that he had heard of in our waters; a northern whaler had come into the harbor a few days before, and the fish perhaps followed the vessel in. He presented a squid, differing from the *Loligo illecebrosa;* appearing on our coast in June, while the latter does not arrive until August. He also gave some bivalve shells and a *Margarita* from the Gulf of St. Lawrence.

Capt. Atwood stated that fish are often swallowed by the cod, pass from their stomach into the abdominal cavity, and are there found "mummified" and adherent to the inner walls; he presented a specimen, apparently of the eel family, thus preserved and hardened, which he had taken from the abdominal cavity of a pollock. Cod are often so wounded by the hooks that the intestines hang out in the water, and yet such fish are seen swimming about with the rest without apparent suffering, and he had no doubt that they bite at the hooks in a few days. He presented two large cod hooks, with portions of the line attached, which he had taken from the livers of apparently healthy cod; the greater part of the hooks was buried in the organ, and must have remained there, he thought, at least twelve months; they must have been swallowed, broken off, and have worked their way through the stomach into the liver.

Mr. William P. Blake, of New Haven, was chosen a Corresponding Member.

January 19, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. Cabot made a statement respecting the ravages of the larvæ of *Dermestes* and *Anthreni* in specimens of birds supposed to be sufficiently protected; the former, he said, attack the skin, the latter the legs and bill. Specimens dipped in a very strong solution of corrosive sublimate, and in a saturated solution of arsenious acid in hot water, were attacked by these larvæ; but specimens dipped into a tincture of strychnine were not touched by them. Of the first two poisons, arsenic is the best; in specimens preserved by the latter the skin was not touched, the larvæ boring in through the legs.

Dr. C. T. Jackson made some observations on the preservation of animal tissues by arsenic; he mentioned a case in which the stomach, carefully washed, had at first assumed a yellowish tint, becoming soft, with an odor of ammonia, but none of sulphuretted hydrogen, then changing into a pasty mass of a custard yellow, and finally of the magnificent red of the sulphuret of arsenic, the sulphur having been obtained from the decomposition of the tissues. In another case, where the amount of the poison was greater, the abdominal organs were perfectly preserved, and the walls shrivelled.

The Secretary read a paper from Dr. Henry Bryant on some of the birds observed by him in East Florida, south of St. Augustine, as follows:—

Cathartes aura. The Turkey Buzzards were much more numerous at Enterprise than the Black Vultures; at Indian River the vultures were the most common; and among the keys both species were rare. Audubon, in his description of this bird, states

that the naked skin about the head is frequently diseased in old individuals. I have often observed this part of the bird, as well as the tarsi, to be covered with warts and excrescences; several specimens that I dissected had the lymphatic glands of the neck much enlarged; one had an exostosis of the posterior extremity of the crest of the sternum, and another a disease of the liver resembling the commencement of cirrhosis.

Polyborus vulgaris. I saw two pairs of Caracara Eagles, one at Indian River on the 15th of March, and the other at Enterprise on the 20th of April. The pair at Indian River were attracted to the place by the offal of the animals slaughtered for the troops stationed there; they were frightened away by the discharge of a gun, and did not to my knowledge return again. The pair at Enterprise, when first seen, were perched on a tree not a hundred yards from the house, in company with a number of Turkey Buzzards. During an hour that I watched them they remained in the same place, occasionally opening their wings, but otherwise motionless, though the buzzards were continually flying to and from an alligator dead on the edge of the lake. They did not seem at all wild, and were apparently on perfectly good terms with the buzzards, not assuming any superiority over them, and allowing them to alight on the same branch with themselves. On shooting one of them, which proved to be a male, the other flew off and did not return till the following day, when it was also shot; this was a female. The male appeared to be in perfectly adult plumage; the female had just commenced changing the plumage of the young bird for that of the adult, showing merely a few scattered feathers of the adult livery. The ovaries of the female showed that she had laid eggs that season. The crops of both birds were empty, and the stomachs filled with a pultaceous mass of putrid animal matter. On comparing them with three South American specimens, I find that the number of the transverse scales of the tarsi and feet vary in a most remarkable manner in the different specimens. One of the South American specimens has the whole front of one tarsus covered with transverse scales, fourteen in number, while there are only seven on the other; these are however separated in two places by hexagonal scales, so that some of the transverse scales are near the head of the tarsus. In a second specimen there are six on one

tarsus and four on the other, and in the third, five on each tarsus. In the Florida specimens, one has four on each tarsus; and the second has four on one and five on the other. The transverse scales on the hind toe present the same irregularity; one bird having four on each toe, a second four on one toe and five on the other, a third four on one and three on the other, a fourth five on one and six on the other, and the fifth five on each. Audubon, in his description, states that the lateral toes are equal,[1] and that the base of the inner toe is scaly, by which I suppose he means that it is covered with small scales. In my specimen the outer toe is considerably longer than the inner, and the distribution of the scales the same on both outer and inner toes. The following measurements in millimetres were carefully taken from the recent specimens:—

	♂	♀
Length	600	600
Extent	1230	1270
Wing from flexure	410	430
Length of tail	210	215
Tarsus	98	99
Middle toe	54	56
Middle toe-nail	26	29
Hind toe	25	25
Hind toe-nail	29	29
Outer toe	42	46
Outer toe-nail	23	23
Inner toe	35	37
Inner toe-nail	29	29
[2] Bill along ridge	38	39
Gape to tip of L. mandible	45½	49
[3] Depth of bill	22	24
[3] Breadth of bill	15	14
Length of nostril	6	6
Breadth of nostril	2	2
Difference in length of tail feathers	30	20

[1] Gray, in his genera, says the inner toe is longer than the outer.
[2] From cere.
[3] At edge of cere.

Buteo lineatus. The most common hawk except the Fish Hawk at Enterprise; abundant everywhere on the St. Johns and Lakes; none seen near the sea-coast; smaller and brighter colored than northern specimens.

Haliaëtus leucocephalus. Very abundant; at Spring-Garden Lake I saw several pairs nesting on the tops of palmetto trees, though there were tall pines in the immediate vicinity.

Nauclerus furcatus. I found this beautiful hawk to be far less abundant than I had expected. I saw none on the sea-coast, and not more than a dozen on the St. Johns.

Ephialtes asio. Near the house I resided in at New Smyrna, there was an old picket fence constructed of palmetto logs; a large number of these had been excavated by the Red-bellied Woodpecker, and in their deserted holes I found three nests of the little Red Owl. In every instance the female was sitting on her eggs, and allowed me to take her in my hand without making any resistance. They were all in full plumage, without any indication of the mottled plumage of the young. Although it would certainly seem a fair inference that the little Red Owl was extremely abundant in that part of Florida, I saw but one other individual during my stay there.

Bubo Virginianus. Near New Smyrna there are three large stone pillars that mark the site of a house burnt by the Indians. They stand near the water, and are entirely exposed to the light of the sun; yet, on the top of one of them, a pair of great Horned Owls had made their nest, and the female could be seen sitting on her eggs in the full blaze of the sun. The top of the pillar not being accessible, on account of its height and ruinous state, I could not examine the nest. Much to my regret, before the young were hatched the parent bird was shot.

Tyrannus Dominicensis. The distribution of this bird is apparently quite irregular; on one small key, not an acre in extent, I have counted four pairs; and on many others, and among them some of the largest, I did not see a single individual. They seemed to prefer what Audubon calls dove keys, which are covered with grass or bushes, and are either skirted round the margin with trees, or else have a few scattered trees here and there. I saw none at the Marquis, none at the Miami, or in the neighborhood of Indian River, but at New Smyrna they were quite

abundant, confining themselves, as far as my observation went, entirely to the dead mangroves. These dead mangroves show a great apparent change in the climate of this part of Florida. They were all destroyed by the great frost as far south as Cape Canaveral, and, from the size of the dead trunks that now cover the marshes, must have been growing for a century. Since the first destruction a second growth sprung up, and after attaining a height of seven or eight feet, was in its turn killed by the cold, and in 1854 a third growth was just making its appearance.

Peucæa Bachmani. This was the only sparrow I saw in the pine barrens near Enterprise, and this only occasionally. It is one of the most difficult birds to shoot without a dog, as it runs round in the grass and dwarf palmettos more like a mouse than a bird, and will not fly until almost trodden on, and then only a few feet at a time. A nest found April 20, resembled in its construction that of the Savannah sparrow; it contained five pure white eggs, nineteen millimetres in length and fifteen in breadth.

Quiscalus major. The boat-tailed Grakle was the most common bird in the neighborhood of Lake Munroe, and could be seen at all times running along the edge of the water, almost in the manner of a sandpiper. They were breeding by hundreds in the reeds near the inlet to the lake. On the 6th of April some of the birds had not yet commenced laying, though the majority had hatched, and the young of others were almost fledged.

Cyanocitta Floridana. The Florida Jay is said by Audubon to be rare on the east coast. Never having visited the west coast, I do not know how much more abundant it may be there, but in the course of a morning's ride in the vicinity of Enterprise, I have seen a dozen individuals. This is one of our most interesting birds, as regards the geographical distribution of species, that I am acquainted with; inhabiting as it does the main land, and with no apparent obstacle to its movements, it is yet confined to a small part of the peninsula of Florida. The exact limits of its distribution north and south I could not ascertain in a short visit, but do not think it can exceed three degrees of latitude, if so much. I saw none north of St. Augustine, or south of Jupiter's Inlet. I never saw an individual either in the pine barrens or in a hummock; it is confined, as far as my observation goes, entirely to the scrub, as it is called. This is a growth of scrub oaks, in

many places so entangled with creeping plants that it is impossible to walk through it without cutting a path. The most favorite haunts of the Jays seemed to be where there were no creeping plants; and in these localities there are generally small spots interspersed among the oaks entirely bare of vegetation. The scrubs are generally found on elevated ridges running parallel to the sea-coast, where the soil is too poor for a growth of pine. The most extensive of these that I recollect is at a short distance from Enterprise, on the Smyrna trail; it is about three miles in width, and apparently elevated eighty feet above the lake.

In its flight and action the Florida Jay resembles the mocking-bird much more than its relative the Blue Jay. It has none of the restless, suspicious manners of the latter. I have never heard it utter but one note, much softer (as Audubon states) than the usual cry of the Blue Jay. The males were generally perched upon the highest branch in the neighborhood of their nest, uttering their rather monotonous song with apparent satisfaction, and occasionally gliding or rather dropping down either to pick up some insect or to visit their mates, or when there were two pairs in the same vicinity, to chase away the rival bird if he happened to approach too nearly their peculiar territory. They seldom fly more than a short distance at a time, and seem to trust for protection to the difficult access to their abodes. They evince a great partiality for particular localities; and on the road from Enterprise to New Smyrna I found them exactly in the same places, sometimes two or three miles apart, for three successive years. Generally only a single pair is seen at a time; but in one place in the scrub mentioned above, near a large pond with a few pines scattered about it, I found three pairs. When they live in such localities as I have found them to prefer, they cannot do much mischief by destroying the eggs or young of other birds, as you may travel for miles through the scrub without seeing any other small bird. Wherever there is a house near the scrub, the mocking-bird and cardinal bird, and probably other small birds, make their nests frequently; but the jay is not fond of civilization, and is seldom seen in such a situation.

A nest found on the 15th of April in a scrub oak about three feet from the ground, was built of small twigs, compactly and carefully lined with fibres of the dwarf palmetto, that had appar-

ently been brought a distance of half a mile. The cavity measured 120 millimetres in breadth, by 40 in depth. It contained three eggs of a light blue, sparingly sprinkled with rufous, the spots larger and more numerous toward the larger end. Another nest, found a few days later, contained five eggs of a more neutral tint, and with the spots darker and larger and more evenly distributed.

Campephilus principalis. I found these magnificent woodpeckers quite abundant in the neighborhood of Enterprise. They are not often seen in the pine barrens, but there was scarcely a swamp or hummock without at least one pair. From the quiescent state of the genital organs of the specimens procured by me from March till May, they would seem, unless these were exceptions to the general rule, to breed either very early or very late, probably the former.

Dryotomus pileatus. The Pileated Woodpecker is still more abundant. Near Fort Capron at Indian River there was an old fence of palmetto logs, which was a favorite resort of these birds; while they were busily engaged in searching for insects on one side of this fence, I have often approached them so near as to be able to touch them with my hand, but never succeeded in frightening them so as to produce convulsions by striking the log suddenly, as described by Audubon. If I remained quiet, and the bird became aware of my presence by climbing round the log so as to get sight of me, it never flew off at once, but retreated immediately behind the log; and either remained some time in the same place before flying away, or else ran along the log to some distance, occasionally peeping over the top at me. It would seem as if the sense of hearing could not be so acute as in most birds, for when they once get sight of any one who may be attempting to approach them, it is impossible to get within gunshot of them.

Aramus scolopaceus. The everglades, and the lagoons and bayous leading out of them, are considered by Audubon as the head-quarters of this bird. That this may be true of certain parts of these singular regions I think may be correct; but in the visits which I have made at different times to that portion of the everglades situated in the neighborhood of Fort Dallas, I never met with an individual. I have never met with it either on the shallow ponds and wet savannahs, so numerous in

the neighborhood of Indian River, and which may be considered as the commencement of the everglades, and are apparently most favorable to the peculiar habits of the Courlan. The part of Florida in which it has been my good fortune to meet with it has been on the St. Johns and waters connected with it, between Lake Harney on the south and Lake George on the north. Above the former lake I did not ascend the river, in consequence of the troubles with the Seminoles; and below Lake George the country is so much more thickly settled that I did not think it worth while to examine this portion, though I have no doubt that it would be met with on Dunn's lake. From the banks of the river between Lake George and Lake Harney being almost entirely uninhabited, and never disturbed by steamboats, I expected that this part of the country would afford me abundant opportunities for studying the habits of this bird. My disappointment was great at finding this to be by no means the case, principally from the river being deep and narrow, and presenting but few of those shallow enlargements which are its peculiar characteristic. I saw only a single specimen of this bird here, and heard but a few others. On descending the river, I first met with it at the Wikiva, a narrow stream running into the St. Johns about twenty-five miles from Enterprise. I shot a pair here, but could not get them, as the river was entirely covered by the water-lettuce, as it is called. From the Wikiva I found them more and more numerous as I descended the river, wherever the locality was suited to their habits, until I arrived at Spring Garden Lake, where they were much more numerous than I have ever seen them elsewhere. This lake is considered by Audubon as their most northern locality, and may in a general way be so considered, though I killed a pair near the entrance of Lake George. Lake Dexter, as it is also called, is a large sheet of water that might be taken as the model of the shallow enlargements so frequent in the upper part of the St. Johns. Its surface is covered for hundreds of acres with tangled masses of floating aquatic herbs, presenting in every direction narrow and crooked channels so intricate as to be impassable for any animal less amphibious than an alligator.

The Courlan is generally seen standing on the edge of the shore, or else on the nymphæ or other broad-leaved plants which are

able to support its weight. It is very tame and unsuspicious for so large a bird, always, as far as my experience goes, allowing itself to be approached within gunshot, not hiding or running like a rail, but standing in the same place, and bobbing its head up and down like a sandpiper. On taking wing it utters a loud cluck, and if a tree is in the neighborhood generally alights on it, sometimes even fifty feet from the ground; but if not, it generally alights in some thick part of the marsh, and is not easily started again. On the St. Johns it feeds principally on a species of Natica, which is extremely abundant, and also on the small Unios. The large green snail, so common in the everglade, is not very often met with on the St. Johns. Its manner of feeding is to hold the shell in one of its feet, and then with a few blows of its powerful bill to detach the animal, which it immediately swallows. All the specimens I killed had the stomach filled with the more or less digested remains of various mollusks—principally Unios. I have never seen any of these birds swimming, like the Gallinules, though they undoubtedly can do so. The common note of this bird is the most disagreeable of any of our native birds, and resembles more that of the peacock than that of any other bird I am acquainted with; it is if anything more powerful, and equally harsh and disagreeable. It is very fond of uttering it. Besides this, which I presume is the call-note, it makes a number of other sounds, all of the most inharmonious description, but of which I can convey no correct idea.

Incubation commènces generally in February; the few nests which I saw were made on low willows. In Spring Garden Lake I saw four, on one small island about fifty feet in diameter. The number of eggs is unusually large—fifteen having been taken from one nest by a boy I employed to collect eggs for me. The Courlan is apparently very tenacious of life; several of those I shot presented extraordinary cases of fracture—one specimen had both humeri united in such a way as to shorten them more than half an inch, at the same time forming a decided angle. The same specimen had also an old fracture of the tibia. It had probably been wounded from the steamboat, it being customary to shoot at any animal large enough to make a fair mark. The flesh is considered good eating by the inhabitants, and it is consequently shot whenever an opportunity offers. From its unsus-

picious nature, and its betraying its whereabouts so conspicuously by its loud cries, I have no doubt that as soon as this part of Florida is settled, it will be exterminated.

Knowing that Audubon gives an apparently careful dissection, made by McGillivray, I did not take any note of my dissection. On referring to the book, however, I was surprised to find no allusion to the curious arrangement of the trachea in the male. In the Swan and Whooping Crane the trachea makes a single turn in the crest of the sternum, and in the Guans between the skin and the pectoral muscles, but in the Courlan it forms a sort of knot before entering the thorax, about half-way down the neck. This does not present precisely the same arrangement in every specimen, the number of turns and the extent of these varying slightly. One at present before me is about an inch in diameter, and an incision made across the centre of it would divide the trachea six times.

Grus Canadensis. In a former communication I stated that the Sand-hill Crane begins to breed about the 1st of March. I have since then ascertained that it sometimes breeds much earlier. On the 11th of March a young bird was brought to me, which already stood nearly two feet in height; it was covered with down of a ferruginous color above and cinereous below; the tarsi were of a reddish-brown color. The naked skin on the head was of the same relative extent as in the adult, the bill much shorter, and the eyes large and projecting, the whole bird looking very much like a miniature ostrich. The feathers covering the body were about an inch in length, hidden by the down; the quills were about two inches in length. The young remain with their parents until fully grown, and are fed for a long time by regurgitation. They do not fly until they are as large as their parents, but run with great speed, and hide like a young partridge. A nest found on the 11th of March contained two eggs in which incubation had just commenced; another found on the 15th contained two fresh eggs, and a third on the same date contained two eggs nearly hatched. This is another of the birds whose geographical distribution is especially interesting. It is found breeding all through the lower part of the peninsula of Florida, and again in Wisconsin and the Northwest, none being found in the intermediate region except when migrating.

Gallinago Wilsonii. In a small, dry pond near Enterprise, I saw some dozens. On the 20th of April they all seemed to be paired, and from the lateness of the season seemed as if they were going to remain in the vicinity.

Himantopus nigricollis. In a little creek about a mile from Enterprise, I found every year a number of pairs of Stilts. Its flight, which resembles generally that of the Greater Yellow Shanks, is swifter and more irregular.

Ibis alba. I saw no Scarlet or Glossy Ibises while in Florida. At Indian River the White Ibises were very numerous, flying up and down the river every day. Specimens, shot as late as the 20th of April, were in the midst of the spring moult, and had not commenced laying that year. On the St. Johns I saw one large flock in the neighborhood of Volusia, but none at Enterprise.

Tantalus loculator. I visited two breeding-places of this bird; the first was in a large cypress swamp at the head waters of the St. Sebastian, a small stream flowing into Indian River about twenty miles north of Fort Capron. The trees here were more than a hundred feet in height, and I could not by any means at my disposal get access to the nests. The Ibises here were breeding in company with the large white Egret. At the other breeding-place I was more fortunate. I was informed of this by Capt. Dummet of New Smyrna, who told me that he had visited it some five or six years before, and that he presumed no other white person had ever done so. It is in the cypress swamp forming the southern border of Lake Ashby, a small sheet of water about fourteen miles from Enterprise, near the New Smyrna road. The moment the boat which I had had hauled there was launched, the alligators assembled for the purpose of examining the new visitor; and before we had arrived at the breeding-place there were more than fifty following the boat, the nearest almost within reach of the oars. On shooting a bird, the instant it touched the water it was seized by an alligator; and I was obliged to kill half a dozen of these creatures before I could secure a specimen, and even after this I was generally obliged to fire one barrel at the bird and the other at the nearest alligator.

There were probably a thousand pairs nesting here; every available spot on the tops of the cypresses had been taken possession of by a pair of Ibises, and lower down were numerous

nests of the Anhingas. No other birds were breeding here except a single pair of Fish-Hawks, whose nest was surrounded by those of the Ibis. The most favorite trees were those that were growing in the water, so as to be inaccessible from the land; these were dwarfed, and gave a capital opportunity of examining as many of the nests as was desirable. On first approaching the shore, the birds all rose and flew round in circles, and, after a few of them had been killed, flew off, but soon returned and alighted out of shot, on the trees. The nests were made of small twigs, and seemed to have been occupied for several years; the cavity was deep, and lined carefully with the long moss. The eggs were three in number, nearly white, when not soiled by the parent birds or stained by the moss. Three specimens selected from some dozen gave the following measurement: the longest, 65 millimetres in length and 39 in breadth; the broadest, 58 in length and 45 in breadth; and one that seemed to be of fair average size, 59 in length and 41 in breadth. Incubation had universally commenced by the 1st of April, and many of the young were already hatched, the largest being about the size of a pigeon, and entirely covered with white down.

Audubon, in his description of this bird, alludes to Bartram's description of it in the following language: "But the habits of this bird are entirely at variance with the above quotation to which I direct your attention not without a feeling of pain." I think if Audubon had remembered what he often states himself, that the habits of birds vary at different times and places, he would not have made these remarks. It so happens that I went over precisely the same ground on the St. Johns as Bartram, and in the same way; and that strange as it may seem, when the long period of time that has elapsed is taken into view, my journal, as far as it goes, is almost an exact repetition of his. While I was in Florida I never saw a flock of Ibises except at their breeding-places, and even there, except when they were disturbed, they flew off and returned either singly or in pairs. I did not see them feeding in more than a few instances, and then never more than a pair at a time. The stomachs of all those killed by me contained nothing but crawfish, which could not have been procured readily in the way mentioned by Audubon as their *only* method of feeding.

Platalea ajaja. The Roseate Spoonbill breeds in such numbers at Indian River that I have known one person to kill sixty in a day. The wing feathers are used for making fans, and sell at St. Augustine at from $1.00 to $1.50 for those of a single bird. They commence laying at Pelican Island by the middle of February, and the young are nearly fledged by the 1st of April. On the 10th of April I found one nest containing an egg; all the rest were either empty or the young on the point of leaving them. The egg differs from Audubon's description; it measures 65 millimetres in length, by 39 in breadth, is of an elongated oval form, the difference between the two ends strongly marked. The ground color is white, sprinkled all over with bright rufous spots of different sizes, forming a ring near the large end.

Ardea occidentalis. I found all the herons that are to be met with on the Atlantic coast, with the exception of the *A. cærulea*, breeding among the keys or along the shore of the mainland; all of them on the salt water with the exception of the great Egret, and this species I found in only two places,—on the head waters of the St. Sebastian, breeding in company with the Wood Ibis, and on a small island in Lake Jessup, without any other birds. Their attachment to their breeding-places was strikingly shown at this last-mentioned place. About a month before my visit to the island, a dense tangled growth of coarse marsh-grasses and bushes, with which it was covered, had been accidentally set fire to, and many of the birds and the majority of the nests destroyed; but at the time of my visit these had been rebuilt, and the birds were again sitting on their eggs. In the few nests which had not been destroyed, and which in most instances were blackened by the fire, the young were already hatched and nearly half grown. The Great White Heron I found breeding on many of the keys. Two nests were rarely seen near each other, and only in one instance did I find two nests within twenty feet of one another. They did not, however, seem to object to the company of other species. I found one on the same bush with a nest of the Great Blue Heron; and at Sandy Key, near Cape Sable, I found several pairs breeding on the prickly pears which were growing amidst trees covered with the nests of the beautiful Louisiana Heron. I never saw more than five or six individuals feeding near each other, and I should think it was as much more solitary

in its habits than the Great Blue Heron as the latter is than the majority of other species. Audubon says that they cannot be killed with anything smaller than buckshot; I found no difficulty in killing them with small shot, and should say, that like all other herons, they are easily killed if within shot. They are by far the wildest birds of the genus that I am acquainted with. I think they must commence laying by the first of February, if not sooner, as many of the young were nearly fledged by the 20th of April, and at this time, which was the date of my arrival at the keys, none were less than half grown, and all older than the young of the Great Blue Heron. At Indian River I have seen the young of the latter several days old by the 1st of March. Though I cannot speak from personal observation, as I have never been in Florida before the spring months, I am inclined to think that, from its almost tropical climate, the period of reproduction of many birds is not so narrowly limited as in more temperate climates. I have been told by many of the inhabitants that the Cormorants and Pelicans breed all through the year. I have certainly seen on the same day nests just built and birds fully fledged. At a place called Stirrup Bight, in the keys, the young Cormorants were of all sizes and ages on the 22d of April. The Pelicans I do not think commence breeding quite as early, though I have seen young by the 1st of March; still this was an uncommon circumstance, and few of the young had made their appearance before the middle of April.

Pelecanus Americanus. On the sand bars at the mouth of the St. Johns, White Pelicans can be seen during the winter and early spring months by hundreds; they do not associate at all with the Brown Pelicans. I have never seen them north or south of the St. Johns, though I have been told that there is a certain island in the Musquito Lagoon where they could be found. Why they should be found so very abundantly in a single locality, while apparently there are many others quite as suitable to their habits, and where they would certainly be much less liable to be disturbed, is quite strange.

Pelecanus fuscus. The Brown Pelican is seen during the warm months in great numbers around every inlet and bay south of St. Augustine. When flying in long lines, as they generally do, they present a singular appearance, and seem to be playing

the game called by boys "follow the leader," as they alternately sail and flap their wings, each one doing so on arriving at the exact spot where the leader commenced; they also, if the sea is at all rough, follow the undulations of the waves, rising and falling with them. One of the most singular circumstances connected with this bird is mentioned by Audubon, that of the Black-headed Gulls alighting on the heads of the Pelicans after they have made a plunge. I have seen as many as fifty pairs engaged in this singular manœuvre; the Pelicans appearing to be wholly indifferent to the attentions of their more agile companions. It would seem at first that the weight of the Gull would be rather disagreeable to the Pelican, but I presume that it is not, as the latter never attempts in any way to dislodge it. The plunge of the Pelican is quite singular in its style, and I could not for a long time divest myself of the expectation of seeing one of them break its neck. They never give any indication of being about to plunge, as all other birds do, either by hovering or sailing in circles, but when apparently flying with no other intention than that of moving from place to place, they suddenly fall as if struck with an apoplexy, striking the water with so much force, and making such a splash, that I was unable to determine whether they immersed the whole body or not. It is not uncommon to see one of these birds with a hole through the membrane forming the pouch caused by the spine of some fish, and I was at first quite puzzled by occasionally seeing one with a bright red throat, until on shooting one I found that it was caused by blood from a wound of this description. I have visited a great number of the breeding-places of this bird, from the Tortugas to New Smyrna. At the Tortugas I found only a few pairs breeding, on the bushes at East Key, the principal resort of the Noddies and Sooty Terns. I found them breeding in larger and larger numbers as I went north, until I arrived at Indian River, where I found the most extensive breeding-place that I visited; this was on a small island, called Pelican Island, about twenty miles north of Fort Capron. The nests here were placed on the tops of the mangrove-trees, which were about of the size and shape of large apple-trees. Breeding in company with the Pelican were thousands of Herons, Peale's Egret, the Rufous Egret and Little White Egret, with a few pairs of the Great Blue Heron, and Roseate Spoonbills; and

immense numbers of Man-of-War Birds and White Ibises were congregated upon the island, and probably bred there at a later period than my visit. North of Cape Canaveral the mangroves being destroyed, they place their nests upon the ground as in the Gulf of Mexico. On one island that I visited, the nests were arranged either accidentally or intentionally in rows. They do not seem inclined to relinquish their habitation very readily. Opposite Dunlawton, a plantation at New Smyrna, is an island where they must have been disturbed for many years, but at the period of my visit they were engaged in arranging their nests, which covered the greater part of the island. The process of laying must be attended with more difficulty in the Pelican than in other birds, if we can judge from the fact that the eggs are always more or less marked with blood. I have seen hundreds of the fresh eggs, and have never found one free from this peculiarity. Audubon, in his description, alludes to this as "a few faint streaks of a rosy tint." The eggs are as undesirable an article of food as the birds themselves. On one occasion, having been on short allowance for a day, I endeavored, in company with some of the officers then stationed at Fort Capron, to make a meal of them, but, after a few mouthfuls, we decided unanimously that it was better to go hungry a little longer. Three eggs selected from a large number gave the following measurements,—one, 72 millimetres in length, by 43 in breadth; another, 75×47, and a third, 63×45, the second being about typical as to proportions, but rather larger than the average.

Sula fusca. These birds were quite numerous at the Tortugas, but I did not find any breeding there. I was told by the keeper of the light, who had been familiar with the locality for eighteen years, that he had occasionally found an egg on Northeast Key, a mere sand-bank, which he presumed had been dropped without the bird intending to hatch it, but that he had never seen or heard of a nest on a tree. I inquired of all the fishermen and wreckers, but could find no one who had ever seen any breeding at the Tortugas. If Audubon's description were not so detailed, I should think he had seen them perched on the Pelican nests, where they seem to be quite at home, and taken them for the real owners.

Sterna Cayana. On the 8th of May I visited Northeast

Key, and found this tern breeding there in great numbers, in company with Cabot's Tern, *S. acuflavida;* the nests of both species were mere hollows in the sand, and placed as near together as the birds could sit without disturbing each other. The eggs of the Cayenne Tern were generally of nearly the same size, and did not offer much variety in the markings compared with those of most terns. Three of them measured as follows: one, 63 millimetres in length by 39 in breadth, a second, 57×42, and the third, 58×41, the last two of the more usual form. The eggs of the *S. acuflavida* varied very little in size or shape, but much more so in the marking than those of the larger species. Beside these two species, I found the Little Tern and Wilson's Tern breeding at different localities among the keys, and along the shore of the mainland. I saw no specimen of the Roseate Tern. The Noddy and Sooty Tern were breeding at the Tortugas in as great numbers as at the time of Audubon's visit.

Dr. Cabot remarked that he was glad to find his opinion confirmed that the young Red Owls are mottled, and the adults red; an opinion which he had long ago maintained, but which even now is not accepted by all ornithologists.

Dr. Brewer mentioned that he had observed differences in the eggs of Caracara Eagles from Cuba and South America; this, with the difference of the tarsal scales noticed by Dr. Bryant, seems to indicate that the two varieties may be distinct species. He also said that a specimen of Bachman's Finch had been shot last year at Berlin, Mass.

Dr. Brewer read a paper on the distribution and habits of the Summer Yellow-bird, as follows:—

This familiar warbler extends from 68° N. to the northern parts of South America, and from ocean to ocean. It arrives in New England in the first half of May; it is familiar and social, building its nest near houses, and even in crowded cities. The nest is usually made in a low bush, not more than three or four feet from the ground, and its construction displays a remarkable power of adaptation to circumstances, approaching almost to reason; it is firmly and durably built, of a great variety of soft materials; cotton, when it can be found, is a favorite substance.

The female displays wonderful sagacity in the manner in which she avoids the necessity either of abandoning her nest or of hatching the egg of the Cow Blackbird which has been dropped into it; the latter is too large to be removed by the Yellow-bird, and is accordingly covered over, at the same time with her own eggs, probably having been previously pierced; and upon the floor thus made at the bottom of her nest, she lays another set of eggs, building up the sides of the nest to the requisite height—this she has been known to do for this cause even to the third nest-making. From an observation of twenty-five years he believed that the Yellow-bird never hatches the egg of the Cow Blackbird, but always disposes of it in the above manner, sacrificing her own eggs rather than hatch out a stranger which her instinct tells her will destroy her offspring, and impose a heavy burden on herself. That such two-storied nests are not more often found may be owing to the fact that the warbler is a very close sitter, rarely leaving her nest after the deposition of the first egg, so that the blackbird does not find many opportunities of dropping an egg into the nest.

Mr. Putnam mentioned having found three of these two-storied nests in a single season, in this State.

Dr. L. M. Sargent mentioned the case of a woman under his observation, in whom there exists a small supplementary mammary gland, with the characteristic secretion.

Dr. C. T. Jackson exhibited some specimens of Tetradymite, or Telluret of Bismuth, associated with native gold, from Dahlonega, Georgia; the associated rocks were very rich in gold, four times richer than in California. He also exhibited some Itacolumite containing gold, from Hall Co., Georgia, a locality where diamonds of considerable size have been found—and beautiful crystals of Rutile, with Pyrophyllite, from Lincoln Co., Georgia, where it occurs in large masses. In the gold region there are great quantities of specular iron ore; it is proved at every eruption of Vesuvius that specular iron ore is formed

from the decomposed chloride of iron; he believes that in this gold region the gold is brought up with the iron, both in the state of chloride, from which the precious metal and the specular iron are afterward separated by decomposition.

A memorial was presented by Mr. W. E. Baker, describing a plan for the accommodation of the principal associations of science and art in the city, in a large building, and asking its consideration by a committee of the Society. The plan and the subject in general were referred to a committee, consisting of the following gentlemen, viz:—Dr. S. Cabot, Jr., Prof. W. B. Rogers, and Messrs. Barnard, Bouvé, and Whittemore.

Dr. H. R. Storer, having resigned the Curatorship of Crustacea, it was voted that he be requested to serve until the Annual Meeting.

Messrs. John Cummings and C. W. Tuttle were elected Resident Members.

February 2, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Prof. Agassiz made a communication on some new Actinoid Polyps of the coast of the United States.

He remarked that Prof. J. D. Dana made the first step toward a natural classification of polyps, when he divided the order of actinoids into the sub-orders *actinaria* and *alcyonaria*, the former including those actinoids with many simple tentacles, the latter those with eight compound tentacles.

The first specimen described was a new species, with twelve thick and blunt tentacles; the number of tentacles is few com-

pared with those of actiniæ generally; it is of a brown color, and exists as a parasite on the common large brown medusa, *Cyanea arctica;* he named it *Bicidium parasiticum.*

Another was found at low-water mark in Nantucket harbor, a foot or more deep in the sand, sometimes attached to small stones; the shape is elongated and cylindrical, never hemispherical; the tentacles are twenty in number, ending in knobs; the color milk-white, the ends of the tentacles brown; he named it *Corynactis albida*—the *Actinia clavata* of Rathke, from the coast of Norway, probably belongs to this genus. It builds a tube of sand, which is readily disintegrated.

In Charleston, S. C., in 1852, Mr. H. J. Clark obtained several specimens of a polyp, two feet long when expanded, which burrows in the mud-flats, and builds an elastic case of mud and mucosities. It has two sets of tentacles, one around the mouth and the other around the margin of the upper disk of the body; the form is elongated and tapering—in the vertical lamellæ the upper part of each has female organs, and the lower part male organs, instead of alternating on different lamellæ as is usual; it belongs to the genus *Cerianthus.* It differs from other actiniæ in the form and arrangement of the tentacles, in the shape of the body, and in having an anus at the lower extremity. Taking form as determined by internal structure as the characteristic of families, it must be considered as belonging to a distinct family; *Corynactis,* for similar reasons, belongs to a separate family.

We should have in this case three groups belonging to the Actinoids, namely, *Actinidæ, Corynactidæ,* and *Cerianthidæ,* groups higher than families and lower than orders, and accordingly properly called sub-orders.

Dr. C. T. Jackson presented specimens of the red bug (*Reduvius*), a beetle which does much injury to the sea-island cotton by causing a red stain; he had not succeeded in obtaining any coloring matter from them by chemical means.

He presented also some pyrophyllite, or radiated talc, from Lincoln Co., Georgia; this is a trisilicate of alumina, containing a little water, and exfoliates in a very remarkable manner under the action of heat. It is found

associated with rutile, and here, as in Russia, in rocks bordering on the gold formation.

Mr. Sprague called the attention of the Society to a collection of 344 bird skins, snake and monkey skins, and several crania, and other specimens from Brazil.

These objects were sent to B. F. Stevens, Esq., of Boston, by Dr. John C. Reinhardt, of Sorocaba, province of San Paulo, about 300 miles west of Rio Janeiro. This gentleman was engaged as naturalist on board the U. S. frigate Constitution in 1844, and made the voyage round the world under Capt. Percival. He had previously made a trip up the Amazon with Lieut. Strain. His collections were sent to the Smithsonian Institution in 1846. He settled at Sorocaba, and Mr. Stevens, at Mr. Sprague's request, suggested to him that objects of natural history from Brazil would be valuable here. The result was the receipt of two large boxes of specimens by Mr. Stevens, who presented them to the Society in Dr. Reinhardt's name.

Though there are many duplicates, several species will be new to the Cabinet. In general terms the collection contains 70 Humming-birds (6 species), 34 Parrots (7 species), 28 Woodpeckers (7 species), 65 Shrikes and Flycatchers, more than 20 Tanagers, 13 Cuckoos (2 species), 5 Anis, 6 Hawks (4 species), 4 Owls (3 species), 5 Pigeons, 4 Goatsuckers, 6 Toucans, 2 Cassicans, 5 Trogons, 8 Finches, 15 Thrushes, 4 Blackbirds, 2 Swallows, 5 Jacanas, 6 Gallinules, 3 Ducks, a Heron, and several miscellaneous specimens. It contained also the skulls of a Jaguar, Tapir, Brocket deer, Armadillo, Paca, two Howling monkeys and a hyoid pouch, and a smaller monkey, the skins of two Anacondas, and a small monkey of the genus *Midas;* a large fish of the genus *Chalceus*, probably the species *Amazonicus*, a very valuable specimen; the pensile nest of an Oriole; and a large shell of the genus *Bulimus*.

It was voted that the thanks of the Society be presented to Dr. Reinhardt and to Mr. Stevens for this valuable donation.

The Committee appointed at the last meeting to take into consideration a plan submitted for procuring better accommodation for the Society's cabinet and library, reported to recommend the appointment of a committee to confer with such Societies, scientific, literary, and industrial, as may be deemed advisable, with power to arrange some plan for joint action for the procurement of land, funds, &c., and that said committee be urged to prompt action, with the view of petitioning the present legislature for aid.

The Report was accepted; and the same committee was reappointed, with power to fill vacancies, and to increase their number to seven.

Mr. J. M. Barnard, from the committee on the memorial to the legislature concerning the republication of Dr. Harris's work on Insects, with illustrations, reported that the memorial had been presented and strongly advocated, with a good prospect of success as far as could be ascertained. It would take two years to make the necessary collections, and the labor of making these had been freely assumed by many competent persons. The Report was accepted, and the committee discharged.

Mr. Charles Stodder exhibited 60 species of *Diatomaceæ*, of 12 genera, found in a small stream in West Roxbury by himself in July, 1858; of these, two were new species of *Stauroneis*, which he called *S. Baconiana*, and *S. pellucida*.

The list is as follows:—

Eunotia monodon, diodon, triodon, tetraodon, pentodon, diadema, hexaglyphis, octodon, enеaodon, decaodon, hendecaodon, serrulata, prionotus? quindenaria, bidens, 15.

Himantidium arcus.

Surirella biseriata, W. S. variety.

Tabellaria trinodis.

Synedra ulna.

Gomphonema geminatum, acuminatum, coronatum, turgidum, gracile, 5.

Cocconema lanceolatum.

Cocconeis placentula.

FAMILY NAVICULACEÆ.

Navicula dilatata, amphigomphus, fusidium, dicephala, legumen, biceps, platalea, 7.

Pinnularia legumen, dactylus, digitus, macilenta, decurrens, inequalis, termes, major, W. Sm., leptogongyla, viridis, 10.

Stauroneis platalea, Ehr., pteroidea? lanceolata, Kutz., gracilis, amphicephala, Baconiana, C. S., nov. spe., pellucida, C. S., nov. spe., Baileyii, phœnicenteron? anceps, isostauron, cardinalis, aspera, birostris, Ehr., 14.

Amphiprora navicularis.

And several undetermined species of Synedra, Navicula, Pinnularia, Himantidium, Cymbella, Fragillaria, Diatoma? Cocconeis, Tabellaria, Homœocladia, Melosira.

The description of the two new species is as follows:

STAURONEIS BACONIANA. Stauroneis medium size; side view beaked; beaks produced; apices rounded; stauros extends to the margins; very fine transverse lines radiating from centre.

Front view (of Wm. Smith, lateral of Ehrenberg) not quite so wide as side view, and the beaks have a very slight sigmoid curve.

Lon. .12 to .14 millimetre; side view lon. 6½ times the breadth; front view 6 times the breadth. Abundant.

Outline of side view resembles *S. Sieboldii*, Ehr., but is much more slender, the longitude of Sieboldii being 4 times the breadth. Front view of Sieboldii unknown.

STAURONEIS PELLUCIDA. Very small. Side view: outline of sides a regular curve, apices truncated and broadly rounded, stauros broad, nearly square, and does not extend to the margins,

median line and terminal apertures (so called) very distinct, no striæ detected with Ross's $\frac{1}{8}$ in. objective. Front view: form the same as side view, except the sides are nearly parallel, instead of being as much curved as in side view.

Lon. $\frac{3\frac{1}{2}}{100}$ mm. lat. $\frac{1\frac{1}{2}}{100}$ mm. Very rare.

Mr. William E. Baker, of Brookline, was chosen a Resident Member.

February 16, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. T. J. Whittemore read the following description of a new species of Helix, from Maine.

HELIX MILIUM Morse.

Shell minute, transparent, shining; epidermis white, with a greenish tinge; distinctly and regularly striated above; whorls rounded, rapidly enlarging; suture very deeply impressed; spire slightly elevated; microscopic lines running parallel with the whorls, more conspicuous beneath; umbilicus quite large, deep, and showing all the volutions; outer lip sharp.

Diam. 0.05, height 0.02.

Distribution—Portland, Me.; Augusta, Me.; Bethel, Me; Saco, Me.; Westbrook, Me.

Observations. The rapidly enlarging whorls remind one at first sight of the young of *H. indentata*, Say. The under side resembles slightly the young of *H. minuscula*, Binney. It is about the size of *H. minutissima*, Lea.

The peculiarities of the shell are its diminutive size, its rapidly enlarging and well-rounded whorls, its deep and regular striations, which become obscure at apex, and the microscopic lines running parallel with the whorls.

This little shell I first found at Mt. Independence, Westbrook,

Me., Aug. 16, 1857, in company with *Pupa exigua*, Say, and the smaller Helices.

Found generally on low lands, where they seemed to be surrounded by water, though it has been found on high lands where the ground was comparatively dry. Mr. Charles B. Fuller, of Portland, found them quite numerous in a grove of pines,—an unusual place for Helices to be found in.

Dr. C. T. Jackson observed that, having searched in vain for a red dye in the red-bug (*Reduvius*), he had found the whole insect rapidly soluble, with effervescence, in nitric acid, forming a dark brown solution. On dipping a piece of flannel prepared by an alum mordant into this solution, and then into an ammoniated solution, he obtained a deep rich orange and permanent dye; it does not take well on cotton fabrics. A permanent yellow dye, and one which could be used as a basis for greens and browns, would be a very desirable thing, as much of the yellow flannel is dyed with chromate of lead, as well as with the yellow berry, and might prove dangerous if worn next the skin. It does not make a good pigment, as its lake is ochreous, and not a desirable color. These insects are very abundant and destructive, and the possibility of their being made available in the arts would add another and a powerful motive for their collection and destruction.

Dr. Jackson also made some remarks on the corrosive properties of Mexican guano.

This substance in twenty-four hours will destroy the bags which contain it, in a few days will render a cask rotten, and in the course of a short voyage will so dissolve out the oakum used in caulking vessels as to render them leaky, as has been proved in several instances, to the knowledge of Mr. P. A. Stone, of Boston. This guano has been so altered by the action of rain and sea-water, that it presents an excess of phosphoric acid, in the form of soluble acid phosphate of lime. Whether the solvent action is due to free phosphoric acid, or to the presence of the animal matter with it, is not satisfactorily determined. The ammoniacal guano, such as that from the Chincha Islands, has no such effect on cloth or wood.

Prof. Parsons referred to a statement of some chemist in Cincinnati, that all our native grape juice has a relative excess of malic acid, and a great deficiency of tartaric, differing in these respects from that of European grapes.

Dr. Jackson stated that American wines contain considerable tartaric acid, and that it is abundant in our wild grapes.

Prof. Parsons thought that, at the present prices of American wines, no other so profitable use could be made of land as to plant it with vines.

Edwin Harrison, of St. Louis, was chosen a Corresponding Member, and Messrs. Benj. Perkins, Jr., of Roxbury, C. L. Amory and M. D. Ross, of Boston, Resident Members.

March 2, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. T. Jackson gave a sketch of the theory of metamorphism in geology as now generally adopted. He also spoke in detail of the experiments of Daubrée in France, which have proved that water at moderate temperatures will transform and produce minerals, and even ores; and that glass, under the action of water at 400° C., becomes an opaque spongy mass filled with quartz crystals and Wollastonite, the water becoming a saturated solution of silicates of potash and soda. Pine wood in his tubes became anthracite so hard that steel would hardly scratch it; a result which affords a satisfactory explanation of some of the phenomena of the coal-fields which have long been subjects of dispute. Some authors maintain that bituminous coal has been formed from resinous plants only; others have said that all coal was originally bituminous, anthracite being caused by the driving off of the bitumen, and being nothing but a compressed coke—both these explanations are unsatisfactory. If we regard the anthracite coal-fields of Pennsylvania as having been acted upon by hot water under ocean pressure, the explanation seems satisfactory;

on the contrary, the Western coal-fields, highly bituminous and undisturbed, have probably been formed without such agency. From this it would appear that anthracite or bituminous coal may be formed from the same plants, according to the presence or absence of heat, water, and pressure.

Mr. Stodder observed that a similar theory had been offered, he believed, by Mr. T. S. Hunt; and also by Prof. Rogers, who ascribed the change to the presence of heated steam.

Dr. Jackson alluded to the manner in which the native copper and silver of Lake Superior are formed; in his opinion from the chlorides of these metals in contact with iron, as he had explained at a previous meeting in regard to gold. It is well known that at the junction of the trap with the metalliferous vein, the rock becomes brown from the oxidation of the iron. When once deposited, it continues to be formed by the operation of the same causes; and when the copper is deposited, pure metallic silver, formed from the chloride, is plated upon it; the two metals, chemically pure, are in contact, yet unalloyed. The old theory of the formation of these deposits from acid solutions is unsatisfactory, and unable to account for the absence of the ordinary lime salts.

The resignation of Mr. A. E. Agassiz as Curator of Entomology was announced and accepted; and Dr. Durkee and the Secretary were appointed a committee to nominate his successor.

Dr. John C. Reinhardt, of Sorocaba, Brazil, was chosen a Corresponding Member of the Society; and Messrs. William Putnam, of Boston, and Emanuel Samuels, of Mattapan, Resident Members.

March 16, 1859.

T. T. Bouvé, Esq., in the Chair.

Mr. T. J. Whittemore presented some living specimens of *Helix aspersa* from Rochelle, France, and said he hoped that some of the members would attempt to preserve them. They can be kept alive until vegetation springs up by keeping them warm and feeding them with damp bread. They are used as food by the peasantry of France.

A fine specimen of cannel coal from the Western Mining and Manufacturing Company's mines on Big Coal River, a tributary of the great Kanawha, Boone Co., Virginia, was presented by Mr. Joshua W. Richardson, of Boston.

The principal deposits are contained in two veins of an average thickness of 40 inches; they lie in the mountain 140 to 160 feet above the level of the valley, and about 20 feet apart; the inclination of the deposits being only 1 foot in 70 affords sufficient facilities for drainage. The deposit is columnar in its structure, with a horizontal lamination admitting of cleavage both ways, so that it is easily mined by means of the pick and wedge. For purity it is probably unsurpassed; it is in demand chiefly for the manufacture of coal oil, though it is excellent as fuel. The thanks of the Society were presented for the donation.

Dr. C. F. Winslow presented the animal of a gigantic clam from Puget Sound, said to be able to project its tube from eighteen to twenty-four inches. It is eaten by the Indians. He stated that he had specimens of the shells measuring about 5×4 inches. Dr. Gould thought the species was probably *Panopæa generosa*, Gd.

Dr. Kneeland exhibited specimens of copper from Lake Superior, illustrating the remarks of Dr. Jackson at the

previous meeting in reference to the deposit of metallic silver and copper in contact, yet unalloyed, and to the forms impressed in the copper by crystals of other mineral substances.

Dr. Cabot remarked that Mr. Baird, in Vol. 9 of the Pacific Railroad Report, makes *Scolopax Drummondii* a synonyme of *S. Wilsonii*, though with a *quære*. Dr. Cabot had obtained specimens of the latter in Massachusetts at all seasons of the year, and he never saw one approaching the former in plumage; the proportions of the two species are also unmistakably different. In his opinion it would be hard to find two allied birds more different in almost all respects than the two considered the same species by Mr. Baird.

Mr. James Lewis, of Mohawk, N. Y., a corresponding member, writes, in a letter addressed to the Secretary:

That within a few years, the Mohawk River has afforded specimens of *Menobranchus maculatus*. The first that he had any information of was caught about five years ago in a net, by persons fishing in the Mohawk. It was then considered a very rare thing. More recently, they have been taken on hooks by anglers; and are beginning now to be of less interest as novelties. Early last spring, while the foundations of one of the old locks in the Erie Canal at this place were being taken up, to be replaced by a new structure, several specimens of this reptile were seen, one of which, about sixteen inches long, was taken alive and brought to him. In the summer following, two about a foot long were taken by a fisherman in the Mohawk. They undoubtedly have come out of the great lakes, probably through the canal from Oswego, and very likely will, ere long, be common in the canal and river, from near Oneida Lake to Albany.

Prof. Parsons alluded to the method of preserving food in air-tight vessels. According to Liebig's theory of eremacausis, if the can be not completely exhausted of air, the decay caused by the chemical action of the oxygen of a single bubble, propagates itself until the whole mass is infected.

From experiments made by Rose, some doubts have arisen as to whether the decay is produced by the chemical action of oxygen; this chemist was inclined to attribute this effect to the action of living organisms contained in the air, and he found that by passing the air through red-hot tubes, so as to destroy all organic life, no effect of decay was produced in the meat exposed to it; he ascertained that these minute organisms could be arrested, though not destroyed, by sifting the air through sponge or tubes filled with asbestos—the tubes he employed were of various substances, and about the size of a pigeon's quill. His theory is strongly in favor of the propagation of epidemic diseases by minute living organisms floating in the air. There may be a difference of opinion in the case of decayed food, whether the change-producing cause be minute organisms, or particles of matter in a state of incipient decay which readily is communicated to the whole mass.

He thought this a matter of considerable practical importance, as the lives of many, and especially of Arctic voyagers, depended in a great degree on the perfection of this preserving process. It has been forcibly suggested and maintained by the London Times, that the fate of Sir John Franklin and his party may have been decided by the imperfect preservation of such articles of food.

Mr. F. H. Storer remarked that the articles to be preserved are boiled, not only to expel air, but to coagulate the ferment in the meat; in fact, the air cannot be fully expelled. He did not think that Rose proves that the cause of decay resides in minute living organisms, rather than matters in a state of incipient decay.

Mr. F. W. Putnam said, that at a previous meeting he had stated that possibly the young specimens of Pomotis presented by Mr. Thoreau were the *P. obesus* of Girard. He had since then examined Girard's original specimens, and found them to be the same. The *P. guttatus* recently described in the Proceedings of the Academy of Natural Sciences at Philadelphia is identical with *P. obesus*. Having teeth on the palatines, and consequently belonging to the genus *Bryttus*, the proper name for the species is *B. obesus* (Putnam). He had also satisfied himself that the *Esox ornatus* of Girard is the same as the *E. fasciatus* of Dekay.

The Corresponding Secretary read the following letters, viz :—

From the Académie Royale, &c., de Belgique, June 28 and December 18, 1857 ; Royal Geographical Society, December 30, 1857 ; Naturhistorischer Verein, Bonn, January 11, 1858 ; Zoölogisch-Botanischer Verein, Wien, March 15, 1858 ; Verein für vaterländische Naturkunde in Württemberg, May 31, 1858 ; Société Royale des Sciences de Liége, June 15, 1858, in acknowledgment of the receipt of the Society's publications ; Société Imperiale d'Agriculture, d'Histoire Naturelle, &c., de Lyon, Lyon, April 2, 1858 ; Oberhessische Gesellschaft für Natur-und-Heilkunde, April 6, 1858 ; Société Royale des Sciences de Liége, June 15, 1858 ; Société Linnéene de Lyon, July 2, 1858, presenting their various publications ; H. Davis, M'Gregor, Iowa, concerning certain specimens intended for the Society ; J. L. Laporte, Bordeaux, November 14, 1858, proposing an exchange of shells ; Royal Dublin Society, September 25, 1858, presenting its Journal, and requesting an interchange of publications ; and Edward S. Morse, Taunton, January 17, acknowledging his election as Corresponding Member.

The committee appointed to nominate a candidate for the office of Curator of Entomology, rendered vacant by the resignation of Mr. A. E. Agassiz, reported the name of Mr. Samuel H. Scudder of Boston, and he was elected.

Messrs. James A. Cutting of Chelsea, Samuel H. Gookin of Boston, John C. Comstock of Cambridge, and Dennis Murray of Roxbury, were chosen Resident Members.

DONATIONS TO THE MUSEUM.

January 5, 1859. A specimen of pilot fish, *Naucrates*, from Provincetown, Mass. ; a squid, differing from the common one, from Provincetown ; some bivalve shells from the Gulf of St. Lawrence ; a mummified fish of the eel family from the abdominal cavity of a cod ; and two large hooks taken from the livers

of apparently healthy cod; by Capt. N. E. Atwood, of Provincetown. A nest of *Zonotrichia pusilla*, Wils., containing three of this bird's eggs, and one of the *Molothrus pecoris*, Gmel.; and the nest of a *Vireo;* by James G. Shute.

January 19. A gopher from Illinois; by Mr. John F. Edwards, of Boston. A pipe fish, *Syngnathus Peckianus*, from Boston harbor; by Dr. S. Kneeland, Jr.

February 2. Specimens of the red bug, *Reduvius*; by Dr. C. T. Jackson. 344 bird skins, snake, and monkey skins, and several crania, from Brazil; by Dr. José C. Reinhardt, of Sorocaba, Brazil. A ring-necked snake, and an orthopterous insect (*Mantis*) from the Lake Superior copper region; by Mr. A. C. Davis, of the Norwich mine.

February 16. Fibres of the inner bark of a Californian tree, resembling Manila hemp; by T. J. Whittemore.

March 16. Living specimens of *Helix aspersa*, from Rochelle, France; by T. J. Whittemore. A piece of cannel coal, from Boone Co., Va.; by Joshua W. Richardson, of Boston. The animal of a gigantic clam, *Panopœa generosa*, Gd., from Puget Sound; by Dr. C. F. Winslow, of West Newton. Larvæ and perfect insects of a large borer from the Cape de Verd Islands; death's head moths from St. Helena; and peat marl, containing minute shells, from the neighborhood of Milwaukie; by Dr. A. A. Gould. Fragments of cedar channelled by boring larvæ; by Dennis Murray, of Roxbury.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1859.

Synopsis of Report on Zoöphytes of the U. S. Exploring Expedition. By J. D. Dana. 8vo. New Haven. *From the Author.*

Ichnology of Massachusetts. By Ed. Hitchcock. 4to. Boston, 1858. *From the Author.*

Report of the Geological Survey of Connecticut. 8vo. Pamph. By C. U. Shepard, M. D. New Haven, 1837.

Smithsonian Contributions to Knowledge. Vol. X. 4to. Washington. *From the Smithsonian Institution.*

Prodromus descriptionis Animalium evertebratorum. Auc. W. Stimpson. Pars VII. 8vo. Pamph. *From the Author.*

History of the Fishes of Massachusetts. By Dr. D. H. Storer. 4to. No. 4. pp. 131–194. *From the Author.*

Edinburgh New Philosophical Journal. New Series. Nos. 14, 15, 16. 8vo. Edinburgh. *From Prof. Henry D. Rogers.*

Notes on American Land Shells. By W. G. Binney. No. 4. 8vo. Pamph. *From the Author.*

Fourth Report on the Geological Survey of Missouri. By G. C. Swallow. 8vo. Pamph. 1859. *From the Author.*

Catalogue of Shell-bearing species of Mollusca. By Frank Higgins. 8vo. Pamph. *From the Author.*

Explanations of a second edition of a Geological Map of Nebraska and Kanzas. By F. V. Hayden, M. D. 8vo. Pamph. Philadelphia, 1858. *From the Author.*

Field Notes of Geology. By A. Osborn. 12mo. Pamph. New York, 1858. *From the Author.*

Notices of Insects known to form the basis of Fungoid Parasites. 4to. Pamph.

Journal of Proceedings of the Massachusetts Horticultural Society. March, 1859. *From the Horticultural Society.*

Proceedings of the American Association for the Advancement of Science. Vol. XII. 8vo. Cambridge, 1859. *From the Association.*

Geology of N. America. By J. Marcou. 4to. Pamph. Zurich, 1858.

American Geology. By J. Marcou. 8vo. Pamph. Zurich, 1858. *From the Author.*

U. S. Naval Astronomical Expedition. Vol. VIII. By Lieut. J. M. Gillis L.L.D. 4to. Washington.

Explorations and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean. Vols. VIII. and IX. 4to. Washington, 1858. *From Hon. Charles Sumner.*

Observations on the Genus Unio. By Isaac Lea. Vol. VI. Part 1. 4to. Philadelphia.

Account of the Remains of a Fossil extinct Reptile. 8vo. Pamph. Philadelphia, 1859.

Descriptions of the Embryonic Forms of thirty-eight species of Unionidæ. By Isaac Lea, L.L.D., &c. 4to. Pamph. 1858.

Conchological Pamphlet. By Isaac Lea. 12mo. Philadelphia, 1858. *From Isaac Lea.*

Proceedings of the American Philosophical Society. Vol. VI. No. 60. July–December, 1858. Philadelphia.

Genera of Recent Mollusca. By H. and A. Adams. Nos. 35, 36. 8vo. London, 1858.

Verhandlungen des Zoölogisch-botanischen Vereins. Band VII. Wien, 1857.

Personen-Orts-Und Sach-Register. 1851–5. 8vo. Pamph. Wien, 1857.

Silliman's American Journal of Science and Arts. Vol. 27. Nos. 79 and 80, for January and March, 1859.

Proceedings of the Academy of Natural Sciences at Philadelphia. January, 1859. pp. 45–84.

Canadian Naturalist and Geologist for December, 1858. Vol. III. No. 6. Vol. IV. No. 1. February, 1859. Montreal.

New York Journal of Medicine. Vol. V. No. 1. January, 1859.

Canadian Journal of Industry, Sciences, &c. No. 19, for January, 1859. Toronto.

Archiv für Naturgeschichte. Nos. 5, 6. 1857. No. 1. 1858.

Journal of the Academy of Natural Sciences of Philadelphia. New Series. Vol. IV. Part 1. 4to. 1858.

Annals of the Lyceum of Natural History of New York. Vol. VI. Nos. 1, 8–13. 8vo. New York.

New York Journal of Medicine. Vol. VI. No. 2. For March, 1859.

Malakozoölogische Blätter. Band V. Bog. 3–10. 8vo. Pamph. *Received in Exchange.*

Annals and Magazine of Natural History. Nos. 13 and 14. Vol. 3. 1859.

Quarterly Journal of the Geological Society. Vol. XV. No. 57, for February, 1859. 8vo. London.

Todd's Cyclopædia of Anatomy and Physiology. Parts 51 and 52. *From the Courtis Fund.*

Life of James Sullivan. By T. C. Amory. 2 vols. 8vo. Boston, 1859.

Biography of Dr. E. K. Kane. By William Elder. 8vo. Philadelphia, 1859.

History of New England. By J. G. Palfrey. Vol. 1. 8vo. Boston, 1858.

Modern English Essayists, Carlyle, Talfourd, Stephens, Alison, Wilson, Jeffrey, Macaulay, Mackintosh, Smith. 8 vols. 8vo. Boston, 1858.

Life and Times of Hugh Miller. By T. N. Brown. 12mo. New York, 1858.

History of the Anglo-Saxons. By T. Miller. 12mo. London, 1852.

History of the Reign of Philip II., King of Spain. Vol. 3. 8vo. Boston, 1859.

Jewish Wars of Flavius Josephus. Translated by Rev. R. Trail. 8vo. Boston, 1858.

Memoirs of the Court of England under the Stuarts. 3 vols. 12mo. (Bohn's.) 1857. *Deposited by the Republican Institution.*

April 6, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. F. Winslow read a communication from Mr. Henry M. Lyman, on the recent eruption of the volcano of Mauna Loa, in the Sandwich Islands.

The eruption occurred on the 23d of January, 1859. On the evening of Saturday, Jan. 22, the snow on the mountain was seen white and unobscured by clouds or vapors; there were no signs of smoke, and none of eruption. On Sunday, thick clouds of smoke were seen gathering about the mountain, and at evening the whole sky was lighted with a terrific glare, and the lava could be seen spouting from a crater near the summit of Mauna Loa. As in all the other eruptions from that mountain, the lava was thrown up in a jet, apparently nearly one thousand feet high; it flowed down the northern slope of the mountain, and in one or two days "formed for itself a covered channel from the summit crater to the plain between the mountains." So rapidly was it poured out, that before the morning of the 24th the lava appeared to have spread across the plain to the base of Mauna Kea. As seen from Hilo, the original source seemed to be very near the crater from which issued the flow of 1855–56; but so dense was the smoke,

that on the 25th (the latest date from Hilo) nothing was known about the eruption except that it was the most brilliant and extensive on record.

A letter from Waimea of Feb. 3, states that on Monday, Jan. 24, two fiery sources were visible,—one appeared to be very near the top of the mountain, but its stream and smoke soon after disappeared; this was undoubtedly the eruption visible at Hilo on Sunday evening—the other was on the north side, further from the top, and sent out its fires in a northwesterly direction; after the third night the smoke cleared away, and showed the burning crater constantly enlarging and throwing up its volumes of liquid fire. The lava poured on in a torrent between Mauna Kea and Mauna Hualalai, until it reached the sea at a little village named Wainanalii, near the boundary between Kohala and Kona, about thirteen miles south of Kawaihae. It reached the sea during the night of January 31, and was still flowing when last heard from, about Feb. 10. The width of the stream was said to be about a mile, and the distance passed over nearly forty miles.

This is acknowledged to be the greatest eruption within the memory of any one now living at the Islands; even as far distant as Oahu the sky was obscured by the dense smoke, and at Lahaina the "reflection on the water was at times like that of the full moon."

It is said that ships sailing along the windward shores of Hawaii, Maui, and Molokai, during the week in which the eruption commenced, and before the lava reached the ocean, encountered immense shoals of dead fish; leading to the supposition that there might have been a suboceanic eruption before the outpouring from the mountain, and that possibly the whole island might have been overwhelmed, had not this side passage given issue to a portion of the lava.

Dr. C. T. Jackson remarked that instances of fish being killed by volcanic eruptions were not uncommon, and he attributed this fact not to the heat communicated to the water, but to the action of gases, especially the sulphurous, sulphuretted hydrogen, and chlorohydric acid.

Dr. Winslow was of opinion that the lava accumulates in large cavities before it is cast up, and is thrown up by a geyser process.

Dr. A. A. Gould read the following descriptions of new species of shells :—

SUCCINEA LYRATA. T. ovata, solidula, luteo-virens, undatim plicis flexuosis lyrata ; anfr. tribus ventricosis, apice obtuso. Apertura ovata, columellâ vix flexuosâ callo perexiguo indutâ. Axis $\frac{1}{3}$; diam. $\frac{1}{4}$ poll.

Near the sea-shore, Loo Choo. W. S.

A small ovate species, quite remarkable for its lyrate surface.

AURICULA (Leuconia, Gray) OPPORTUNA. T. parva, ellipsoidea, solida, livido-albida, lævis ; anfr. 6 ad suturam imbricato-appressis. Apertura falcata, posticè acutissima, anticè rotundata ; labio lamellâ compressâ elevatâ medianâ et lamellâ duplici anticali obliquâ instructo ; labro simplici. Long. 8 millim. ; diam. 4 millim.

Inhabits Loo Choo Is. W. S.

OMPHALOTROPIS STRICTUS. T. elongata, ovato-conica, solidula, lævis, arctè umbilicata ; anfr. 6 rotundatis ad suturam tabulatis. Apertura ovata, peritremate simplici continuo, sed posticè ad ventrem retracto ; umbilico carinâ inconspicuâ approximatâ cincto. Axis $\frac{1}{5}$; diam. $\frac{1}{8}$ poll.

On old stone walls, Loo Choo. W. S.

One of the smallest species yet described, with a very small perforation, and a faint keel around it at a very short distance.

LIMNÆA OLLULA. T. parva, tenuis, ovata, viridi-cornea, impolita ; anfr. 4+, ultimo ventricoso. Apertura rotundato-ovata columellâ simplici, posticè callo lato indutâ. Axis $\frac{1}{4}$; diam. $\frac{1}{5}$ poll.

Streams and marshes on Hong Kong Island. (Wright.)

Very much like a small *L. modicella*.

ANCYLUS GAULUS. T. obliquè pyramidata, apice ad quadrantem posteriorem longitudinis, dextrorsum inclinato, obtuso ; epidermide luteo-corneâ, supernè fuscâ. Apertura rotundato-ovata, intus plumbea. Long. $\frac{1}{5}$; lat. $\frac{1}{8}$; alt. $\frac{1}{10}$ poll.

Inhabits Cape of Good Hope. W. S.

A solid, well rounded species, without any salient characters.

PLANORBIS SPIRILLUS. T. parva, discoidea, utrinque concava, tenuis viridi-cornea, plerumque liris ad quatuor propè aperturam

instructa; anfr. 3+ utrinque apparentibus, suturâ impressâ. Apertura ampla, perobliqua, lata, lunata. Diam. $\frac{1}{8}$; alt. $\frac{1}{20}$ poll.

Inhabits Ousima. W. S.

Very like to *P. albus* and *deflectus*; perhaps the same that Middendorff refers to under the former name, as from Kamtschatka.

SEGMENTINA LUCIDA. T. parva, tenuis, orbicularis, dilutè cornea, radiatim viridi-lineata, supra fornicata, infra poculiformis, vix perforata; anfr. 4, ultimo lato, declivi; suturâ impressâ. Apertura ampla, posticè acuta, anticè rotundata; fauce denticulis armatâ. Alt. $\frac{1}{10}$; lat. $\frac{1}{4}$ poll.

Inhabits Loo Choo. W. S.

Smaller and more elevated than the following, with quite a different surface and color.

SEGMENTINA USTA. T. depressa, orbicularis, concavo-convexa, nitida, umbrina, latè umbilicata; anfr. 6, apicalibus arctissimis, excavatis, ultimo amplo, declivi; suturâ canaliculatâ. Apertura perobliqua, angustè lunata; fauce in fundo quadridentatâ. Alt. $\frac{1}{10}$; diam. $\frac{6}{20}$ poll.

Inhabits Loo Choo Islands. W. S.

Resembles in color *S. Largillierti*, which is larger, less polished, more largely umbilicated.

PALUDINA HISTRICA. T. ovato-conica, variabilis, tenuis, striatula, rufo-cornea; anfr. 6 ventricosis, posticè tabulatis, ultimo ad peripheriam subangulato, albido; suturâ profundâ. Apertura rotundato-ovata, subeffusa; peristomate simplici, nigrescente, umbilicum parvum subtegente. Dimens. $1 \times \frac{3}{4}$ poll.; $1\frac{1}{4} \times \frac{7}{10}$ poll. etc.

Ditches in paddy-fields, Ousima and Loo Choo. W. S.

BITHYNIA DIVALIS. T. minuta, imperforata, ovato-conica, solidula, lævis, olivacea; anfr. 3+ ventricosis, ultimo permagno. Apertura parva, ovata, verticalis; peritremate continuo ad columellam flexuoso. Axis $\frac{7}{10}$; diam. $\frac{3}{20}$ poll.

Inhabits China, vicinity of Canton. Mr. Bowring.

The genus is somewhat equivocal. It has an operculum more like that of a true Paludina than of any other genus.

ASSIMINEA DEBILIS. T. globoso-conica, solidula, luteo-cornea, arctè umbilicata; anfr. 5 tabulatis, ultimo ad peripheriam sub-

angulato. Apertura rotundato-ovata, peritremate continuo, vix incrassato. Alt. $\frac{7}{40}$; diam. $\frac{5}{40}$ poll.

Loo Choo Is. W. S.

Paler and less solid than any other described species; more elongated than the following, and differing in color.

ASSIMINEA RUBIDA. T. ovato-conica, solida, impolita, straminea aurantiaco tincta, perforata; anfr. 6 rotundatis, suturâ profundâ. Apertura parvula, pyriformis, peritremate continuo. Alt. $\frac{7}{40}$; diam. $\frac{3}{20}$ poll.

Inhabits Loo Choo, on beaches. W. S.

Rather smaller than the preceding, and distinguished by its color and solidity.

MELANIA LIBERTINA. T. elongata, turrita, truncata, luteo-cornea, hic illic fuscata, lineis volventibus anticè insculpta; anfr. 5+ convexiusculis. Apertura elongata tortuosa, labro albo posticè sinuato, anticè in canalem obtusam producto; fauce lividâ. Long. $1\frac{1}{4}$; lat. $\frac{1}{2}$ poll.

Simoda and Ousima, in sluggish streams and ditches. W. S.

Generally resembles *M. Virginica* and *indefinita*, Lea, which has a more lax and elongated spire. The grooving varies, and in some specimens is nearly wanting.

MELANIA GRACILINA. T. subulata, truncata, imperforata, tenuis, lævis, olivacea, sulcis acutis remotis cincta; anfr. 7+ convexiusculis, posticis attenuatis, ad suturam maculis fuscis sæpè ornatis. Apertura angustè ovalis, vix effusa; fauce lividâ. Long. 1; lat. $\frac{1}{3}$ poll.

Inhabits Taheiti, common in streams.

Belongs to the peculiar subulate group of Polynesia; peculiar by its grooves and the dots near the suture.

MELANIA DOLOROSA. T. elongata, solida, lævis vel striis raris cincta, picea; anfr. 6+ rotundatis, ultimo bulboso. Apertura ovato-rotundata, vix producta; columella arcuata, lactea; fauce cæruleâ. Long. $\frac{3}{4}$; lat. $\frac{1}{4}$ poll.

In streams near Hakodadi. (Wright.)

Principally noticeable for its sombre appearance, usually incrusted by a rusty, felt-like coating, so as to obscure its true surface.

NERITELLA PUELLA. T. parva, obliquè ovata ad ventrem planulata, lævis, viridescens, lineis angulatis fuscis et interdum fasciis articulatis ornata; anfr. 3, ultimo amplo. Apertura parva, labro producto, columellâ callo copioso indutâ, minutissimè denticulatâ. Lat. max. 7, min. 5 millim.

Inhabits Loo Choo. W. S.

Nearly of the shape and size of *N. viridis*, the spire being less prominent, and the aperture smaller.

NERITELLA (Clithon) PENICILLATA. T. ovato-globosa, obliqua, lævis, viridis lineolis luteis undulatis obliquis ubique ornata; anfr. 3+ ad trientem posteriorem angulo instructis spinas tenues tubulosas ad sex armato. Apertura ampla, labro producto acuto, labio simplici, lutescente; fauce cœrulescente. Axis $\frac{6}{10}$; diam. $\frac{1}{2}$ poll.

Inhabits New Ireland. Lieut. Van Wycke.

Distinguished from most spinous species by its smooth surface, and from all by its delicate lineations.

NERITA PICA. T. parva, tenuis, obliquè ovato-globosa, rudis anthracina maculis parvis multiformibus albis ornata. Spira haud elevata. Apertura semicircularis, labro simplici nigro marginata; columellâ excavatâ, nitidâ, flavescente, edentatâ. Operculum virescens, granulatum. Axis $\frac{4}{10}$; diam. $\frac{1}{2}$ poll.

Inhabits Simoda, very common on rocks.

A small, prettily marked species, remarkable for its destitution of grooves, granules, folds, and denticles.

NATICA SEVERA. T. ovato-globosa, solida, impolita, rufo-cinerea; anfr. 4 ventricosis posticè quadratis, apice fusco. Apertura ovata, labro posticè tenui, anticè sensim incrassato, ad columellam rotundato; umbilico magno, clavo ferè impleto. Axis $1\frac{6}{10}$; diam $1\frac{3}{10}$ poll.

Inhabits Hakodadi Bay. W. S.

From its form and exterior it might be taken for *N. heros*, but it has a very different umbilicus, resembling *N. unifasciata*.

NATICA RUSSA. T. imperforata, ovato-globosa, tenuis, lævis, epidermide tenui cerinâ induta; anfr. 4 ventricosis posticè quadratis. Apertura ovata, subeffusa, labro tenui, umbilico callo compresso albo obstructo. Operculum osseum. Axis 18 millim.; diam. 16 millim.

Arctic Ocean. W. S.

Like *N. clausa*, but larger, the whorls more broadly shouldered, the umbilical region more concave and more perfectly closed by callus than in any shell of that species I have seen.

NATICA PUERILIS. T. parva, ovata, solida, polita, epidermide tenuissima straminea induta; anfr. 4 tribus apicalibus parvis eburnatis; suturâ obscurâ; facie ventrali planulatâ umbilico semicirculari perforatâ plerumque callo impleto. Apertura semiovalis, posticè rotundata; labro acuto. Operculum corneum rubidum. Axis $\frac{1}{2}$; diam. $\frac{3}{8}$ poll.

Inhabits Porto Prâya. W. S.

Resembles *N. glabella* and *N. nitida*. It is, however, more elongated, and less flattened on the face.

GENA DILECTA. T. parva, tenuis, elongato-ovalis, nitida, luteo-virens maculis albis trigonis nigro apicatis interdum serialibus ornata, striis incrementi et striis spiralibus profundioribus decussata; anfr. 3, apice ferè terminali. Apertura angusta, ovalis faciem ventralem ferè adequans; intus nitidè virescens. Long. 8 millim.; lat. 4 millim.

Inhabits Hakodadi Bay, on shells, &c. W. S.

Very delicate and slender, allied to *G. planulata*, a much larger species, and *G. strigosa*, of which it may possibly be the young.

VANICORO SCALARINA. T. ovato-globosa, tenuis, alba, costis remotis elevatis imbricantibus lyrata et filis volventibus decussata; anfr. 4 ventricosis benè discretis. Apertura ampla rotundato-ovata anfractum penultimum vix attigens, labro effuso, labio recto retracto; umbilico amplo infundibuliformi costâ marginato. Long. 10 millim.; lat. 8 millim.

Found at Loo Choo. W. S.

Like *V. Gueriniana*, but differs in its sharper compressed ribs, which stop short at the umbilical ridge.

FOSSAR TORNATILIS. T. solida, ovato-globosa, cinerea; anfr. 3, ultimo magno ventricoso costis elevatis recumbentibus alternatim sæpè minoribus ad 12 cincto (alteris tricinctis) et lineis conspicuis incrementi clathrato; suturâ canaliculatâ. Apertura semicircularis ferè sejuncta; umbilico elongato, plicato. Axis 5 millim.; diam. 4 millim.

Hong Kong Harbor, 10 faths. W. S.

Much like *F. costatus*. Without the animal or operculum it is impossible to say that this shell does not belong to the genus Vanicoro.

Dr. Gould read a letter from the President, dated at sea, 34° S., Jan. 9, 1859, in which the principal incidents of his voyage were alluded to. He was surprised at finding large numbers of *hydrometridæ* in mid ocean, where they sport on the surface as the so-called water-spiders do on fresh water. The phosphorescence of the sea was remarkable, the bodies of porpoises and fish passing through it seeming to be covered with a sheet of flame. He thought the phosphorescence due both to the presence of living organisms in the water, and to that of diffused particles of matter. Dr. Gould referred to its being seen wherever there is agitation of the water, serving as natural light-houses to warn the mariner of rocks and shallows. In a postscript dated Jan. 13, his vessel had come to anchor off Monte Video.

Dr. C. T. Jackson spoke of the peculiarities of thermal springs, and remarked that they are generally found along the line of disruption of strata of rocks, and near the junction of eruptive rocks with those of aqueous deposition. In the Vosges it is at the line of contact of granite and the new red sandstone that the hot springs of Plombières are found. The waters of these springs have a temperature of 73° Cent., or 163° Fahrenheit.

These waters contain 0.03 grammes of silicate of potash per litre. Ancient Roman baths were found at these springs, and the river had been turned out of its natural channel into an artificial one, in order to accommodate the construction of the baths. In these ancient works were found bronze stopcocks, in which the bronze was changed into gray sulphuret of copper. In the bricks of the Roman works, numerous crystals of zeolite minerals were found, which had been formed in the cavities by the action of the mineral waters; also small crystals of fluor spar. Among the minerals thus formed are Apophyllite, Chabasie, Gismondine, Scolecite, Harmotome, Chalcedony, Malachite, Hæmatite, Okenite,

Opal, Hyalite, Arragonite, Calcareous Spar, and a variety of Stilbite. The alkaline mineral waters acting on the components of the bricks and cement formed double silicates most readily. The Apophyllite was found in the cement and not in the bricks, while Chabasie was found in the bricks.

The conditions required for the formation of zeolite minerals are fulfilled most perfectly, when trap rocks are thrown in a molten state into beds of new red sandstone strata. The humid sandstones and slates of that series are in the very condition required for the chemical combinations to take place, under the heat of the trap rocks, and the influence of heated saline waters.

Trap breccia is a mixture of scoriaceous trap rock and sandstone. Amygdaloid is the scoria produced by the interfusion of trap rocks and sandstone. Now in Nova Scotia, all along the shores of the Bay of Fundy, we find in the utmost profusion the Zeolites, Quartz and Amethyst geodes, Apophyllite, Stilbite, Mesotype, Analcime, Agates, &c., in the Amygdaloid, but not in the compact trap rocks.

So on the south shore of Lake Superior, where the trap rocks have been erupted through and between the strata of new red sandstone, we find the Amygdaloid at the point of contact of the trap and the sandstone, and the Amygdaloid is filled with an abundance of Zeolite minerals, Agates, Chalcedony, &c., while the compact trap rocks are not charged with these minerals. Dr. J. therefore inferred that these minerals were produced in the Amygdaloid by agencies such as are cited by M. Daubrée.

Sea-water undoubtedly played a conspicuous part in effecting changes in the composition of rocks, and in the formation of minerals contained in the metamorphosed rocks; and it is probable, in accordance with the views of Forchammer, Mitscherlich, Marignac, Sénarmont, Favre, and Hunt, that the magnesia of the Dolomites came from the decomposition of the chloride of magnesium of sea-water, and that gypsum was also produced by the reaction of the sulphate of soda on carbonate of lime.

Forchammer found that when sea-water was heated with bicarbonate of lime, that magnesia was precipitated, and the proportion augments at higher temperatures under pressure. He found also that gypsum was decomposed in fourteen days when in contact

with carbonate of magnesia, and sulphate of magnesia and carbonate of lime resulted.

Marignac found at 200° Cent., that chloride of magnesium and carbonate of lime reacted on each other, and that double carbonate of magnesia and lime resulted. Sénarmont made a similar experiment. Favre estimates that an ocean pressure of from 500 to 600 feet is adequate to effect these changes when the water is heated.

Referring to the increase of temperature at great depths as a means of determining the thickness of the solid crust or shell of the globe, Prof. W. B. Rogers remarked, that much uncertainty must attend such calculations until all the necessary data have been ascertained. It is not merely requisite to know the law according to which the temperature augments as we descend, and the *ordinary* melting point of the different rocky materials forming the crust, but we must ascertain how and in what degree the melting point in each case is influenced by the pressure to which the heated mass is subjected.

According to the experiments of Bunsen, Hopkins, and others, spermaceti, wax, and paraffine, when heated under powerful pressure, require a higher temperature for their liquefaction than is sufficient to melt them under ordinary circumstances, where the pressing force is only that of a single atmosphere. If, with Hopkins, we assume that the melting point of rocks is in like manner raised by the pressure under which they are placed beneath the surface, we must agree with him in the conclusion that the materials of the earth's crust may retain their solid condition to a much greater depth than has been usually supposed.

We have, however, no warrant for assuming that all, or even the great mass of rocky materials, obey the same law in regard to their liquefaction as wax and the other similar substances above named. It should be remembered that these latter belong to the class of substances which contract as they pass from the liquid to the solid form, while there is another class typified by ice, in which the act of congelation is accompanied by more or less expansion. Now it has been proved experimentally by Thompson, that pressure, instead of raising, actually lowers the melting point of ice; and there is reason for regarding it as a general law, that

all those bodies which expand in becoming solid are similarly affected by pressure, while the other bodies which like wax contract in congealing, have their melting point raised under the same circumstances.

As yet we are too little acquainted with the habitudes of the various rocks in these respects, to decide as to the extent to which the one or other of these opposite agencies of pressure upon the melting point may operate in the interior of the globe, or to form any valid conclusion as to their aggregate effect upon the computed thickness of the crust.

Dr. C. T. Jackson presented a box of the silky growth from the base of the fronds of tree-ferns growing at the Sandwich Islands; this substance is used by the natives for stuffing beds. Something of the kind is found in our own ferns.

Dr. Jackson also presented, in the name of Mr. C. K. Landis of Philadelphia, a specimen of a fungous growth called "Indian Bread," or "Tuckahoe," in the Southern States. He found it to contain no starch, but cellulose and considerable mucilage. It is sometimes eaten.

Mr. Sprague said that it was an underground growth, being a fungus called *Pachyma cocos*. It is supposed to be an arrested stage of some unknown plant, producing only a large sclerotioid mass, and never reaching a perfect state. Such is frequently the case among fungi, the whole genus *Sclerotium* being a heterogenous assemblage of inform growths, which are the non-developed stages of dissimilar plants.

Mr. J. M. Barnard announced that the desired appropriation for a new and illustrated edition of Dr. Harris's work on insects injurious to vegetation, had been made by the legislature.

Messrs. C. Allen Browne, and George H. Hepworth, of Boston, and Mr. Charles H. Morse, of Cambridge, were elected Resident Members.

April 20, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. T. T. Bouvé read a communication as follows:

By the kindness of a friend, the valuable work on the Fossil Footmarks of the Connecticut Valley—The Ichnology of Massachusetts, by President Hitchcock,—has been loaned me for perusal. A few days since my surprise was great upon opening the volume to find a number of pages devoted to the question of who first scientifically described the Footmarks, introduced by the following remarks:—

"Some readers of this Report may be aware that about fourteen years ago a discussion took place between me and Dr. James Deane, of Greenfield, in the American Journal of Science, respecting the first discovery of the fossil footmarks. Having each of us had the opportunity to say what we pleased, it has ever since been my determination to trouble the public no more on the subject. But since the death of Dr. Deane, which occurred during the printing of this Report, some of his friends have thought it proper to revive this discussion, and, if correctly reported in the newspapers, to take such ground as does me great injustice, and casts such imputations upon my character, that I cannot suffer this last opportunity to pass, without a brief attempt to vindicate myself to the citizens of Massachusetts, and especially to its legislators, who have so liberally published this Report. I refer particularly to the Eulogy upon Dr. Deane by Dr. H. I. Bowditch, and to the statements of T. T. Bouvé, Esq. before the Boston Society of Natural History. Were it not for the high respectability of these gentlemen, I should not feel called on to enter upon this defence."

Before proceeding further, I wish to say a word upon the remark, that "since the death of Dr. Deane some of his friends have thought it proper to revive this discussion," inasmuch as in citing the instances, he refers particularly to statements made by me before this Society. I wish to deny for myself, as distinctly as it is possible for me to do it, not only having had any thought of reviving a discussion, but even having had, at the time my

statements so called were made, any clear thought in relation to the discussion referred to. Indeed, so uncomfortable to me are questions generally upon priority of claims in discovery, that my mind naturally is repulsed from their consideration. I am very doubtful whether I ever read until the present occasion moved me to it, the discussion which it is now implied I have a wish to revive. Certainly I had but a vague recollection of it. But I pass to a consideration of the statements themselves. What were they that such notice should have been taken of them? In the remarks made by me upon the death of Dr. Deane, and preparatory to the introduction of resolutions expressive of the loss which the Society had sustained, I used the following language:—

"But it is in his character as a Naturalist, that we, members of the Society, feel the most interest. None of us I am sure can be unmindful of his labors in working out and faithfully portraying the remarkable impressions of the rocks of the Connecticut Valley, or of his yet more valuable and instructive observations upon these interesting mementos of past life. Whatever may be said of others who have honorably worked in the same field, this I think may be truly stated of Dr. Deane, that the first scientific observations upon the footprints were made by him. Years have since passed,—yes, nearly a quarter of a century has gone by since he first called attention to these impressions; but yet though absorbed much in the duties of his profession, he never lost his interest in them. To his mind, nurtured as it had become by their study, questions of important moment depended upon their full elucidation, and certainly he exhibited an untiring devotion in his labors towards the accomplishment of this end."

Now I will take it for granted, that the only passage in this extract to which exception could possibly be made is this,—"Whatever may be said of others, who have honorably worked in the same field, this I think may be truly stated of Dr. Deane, that the first scientific observations upon the footprints were made by him."

Now I wish to state that here, as well as elsewhere, I recognize that there may be scientific observations upon Geological phenomena of most important character made by such as have no knowledge of the science of Geology itself. If a comparative anatomist, having no knowledge whatever of Geology, should be

present at the exhumation of some bones that appeared to be human from some ancient deposit, might not his observations upon them be scientific even though he failed entirely to recognize the bearing that the discovery of such relics would have upon the theories of Geologists? And so of Dr. Deane. If he, a physician acquainted with anatomy, having a recognized scientific taste, after subjecting the so-called tracks of birds to careful attention, comparing them with such as are made by living birds, taking casts that comparisons might be the better made, finally decides that the markings are those of birds, should not his observations be designated as of a scientific character? It was my impression that thus much at least would be admitted of Dr. Deane and his labors, and I therefore used the language I did, not judging that any party would object to it. If, however, it conveys the idea of more than this, if it expresses to any mind aught that would have the effect to detract from the well merited fame of one I have been happy to think of as a distinguished personal friend, I am indeed sorry I did not express my thoughts more clearly. Fortunately for my present object, which is to show that in desiring to honor the dead I intended no injustice to the living, there is a record of my views upon the discovery and investigation of the footprints which was read by me before a full meeting of the Society when giving some account of the specimens in our collection, and which I now regret was not published in our Proceedings. I will read, with your permission, so much of it as relates to both the labors of President Hitchcock and Dr. Deane, that all may see that it has been anything but my wish to deprive the former, in the estimation of a single soul, of the credit of the original scientific investigations made by him with so much advantage to science. I quote from this record.

"In the early part of the year 1835, Mr. Dexter Marsh, of Greenfield, discovered among some flagging stones, with which he was laying the walk in front of his house, a slab having upon it some impressions, which excited strongly his interest and to which he called the attention of Dr. James Deane. * * * *

"As soon as Dr. Deane's attention had been called to the subject, by seeing the slab that Mr. Marsh had discovered, and which was the first slab brought into public notice, he expressed the opinion that the impressions were those of birds, and he wrote

to Prof. Hitchcock communicating to him the discovery and his own convictions. The latter, aware how unexampled was the occurrence of anything denoting the existence of birds at such an early period as their tracks on the Red Sandstone would indicate, of course could not but hesitate in admitting the force of Dr. Deane's views, until he himself saw the specimens; but observation of these dispelled all doubt. He immediately set himself about investigating the subject, bringing to this work a mind largely stored with geological knowledge, and fully appreciating the bearing that his results would have upon the preconceived opinions of scientific men, if he should be able to substantiate to them the truth of his own opinions. Aware of the incredulity with which the announcement of the discovery would be received, especially abroad, he labored hard in collecting specimens and studying them, that he might not fail to carry conviction—then boldly expressed his conclusions to the world. His first article was published in 1836. He has since given many years of his life to the elucidation of the subject, and this he has done so effectively that all doubt has been long removed as to the *animal* origin of these impressions, and almost all as to their having been made by birds.

"To Dr. Deane also the scientific world is indebted largely for information on the subject of the footprints, given by him in various publications, often accompanied by drawings and engravings by himself of the tracks so accurate as to carry conviction even if the text should fail to do so."

Now this was all that was said by me when giving a full account of the discovery of either party; and does this seem like any desire on my part to do less than full justice to President Hitchcock? The remarks in the two papers should be considered together, for I made those at the time of Dr. Deane's death, in full view of all I had before said to the same body. If a scientific character is ascribed to the early observations of Dr. Deane upon the footmarks, is it not also clearly seen that there is no intention of detracting an iota from the merit of Dr. Hitchcock as the one to whom more than to anybody else, the world is indebted for a full investigation of the whole subject?

Before concluding I will add, that of all persons I should probably be one of the last to do, intentionally, less than full justice to

the claims of President Hitchcock, for no one can be found perhaps who feels more indebted to him for scientific information through his publications than myself. No one probably out of the sphere of his personal influence has given more attention to what has come from his pen. Moreover, I have sat at his table, have been the recipient of personal attention and otherwise experienced his kindness.

All this I say to show how far from me is the wish to dim the lustre of his great achievements. Far more pleasure would it give me to labor in defence of his well-earned reputation, if there were need of this. But there never will be, for it rests on too enduring a basis.

Prof. Rogers observed, that the conflicting claims of Dr. Deane and Pres. Hitchcock were those which we find accompanying all great discoveries at the present day; one man makes an original suggestion, and points out the line of investigation, which another follows to some grand and unexpected result. In the present instance, the ornithic character of these tracks had been alluded to by several, even before Dr. Deane; but he appears to have been the first who convinced himself from comparisons and examinations that these tracks were really made by birds. He thought that while to Dr. Deane is due the credit of having made the first scientific examination of these footprints, to Prof. Hitchcock we owe the thorough and comprehensive investigation of all these remains in the light of ample zoölogical and geological comparisons, and the creation from these materials of a new and important branch of American Paleontology.

Dr. J. M. Warren exhibited a series of skulls and stuffed skins of the anthropoid apes, consisting of skulls and casts of the Gorilla, Chimpanzee, and Orang, of both sexes and of different ages, and two skins of the Chimpanzee. He pointed out the principal characteristics of the three genera, and exhibited several plates from St. Hilaire of the Gorilla. He also exhibited the external and internal genital organs of the large female Chimpanzee belonging to him.

Dr. Kneeland expressed the opinion, from the exami-

nation of the Chimpanzee skulls, in which the size and proportions of the head and face, and the characters of the teeth were very different, that Chimpanzee, like Orang, is a generic term, and includes several species. It does not seem possible to refer all these to a single species of Chimpanzee, and that one the *Troglodytes niger*.

Dr. Warren alluded to the fact, which at the present time is worthy of mention, that the Gorilla was first introduced to the scientific world by Drs. Savage and Wyman, in the pages of the Journal of the Boston Society of Natural History; and that even the specimen in the Jardin des Plantes of Paris was obtained by the instrumentality of those who were making collections for this Society.

Dr. C. T. Jackson exhibited a trilobite from the calcareous slate at St. Mary's Bay, the Southern extremity of Newfoundland; it seemed identical with the *Paradoxides Harlani*, from Braintree, Mass. He said that this formation could be followed, though in an interrupted line, from Braintree to Newfoundland. As the people of Newfoundland are now directing their attention to mining, it is probable that the consequent exploration of the country will throw more light upon this interesting question.

He gave an account of the original specimen of *P. Harlani*, which was said to have been stolen from Cambridge, sold to the old Columbian Museum in Boston, and thence purchased by Mr. Alger, in whose possession it now is.

Dr. Jackson also presented some of the berries of the plant (*Rhus succedaneum*) which produces the so-called Japanese Wax, and a specimen of the wax thence obtained.

On boiling the berries in water, the wax rises to the surface; it is a concrete volatile oil rather than a wax; it exists under the

skin of the berry, in abundant granules containing 14.6 per cent. of the wax. It is not likely that it would prove remunerative to bring so light and bulky a material to this country from Japan, for the purpose of extracting the wax here.

Prof. W. B. Rogers agreed with Dr. Jackson, that this substance is not a wax; its fusing point is 20° lower; it is less plastic and ductile, but equally inflammable; it consists of substances resembling stearine, as does palm oil, with palmitic acid. The wax of bees is more complicated, being an animal secretion and not a vegetable product. According to the last authority, the Japanese wax is almost pure palmitine. The Japanese make ornamental candles of this substance, using paper for the wicks.

Drs. Charles M. Tuttle, of New Bedford, George Suckley, of New York, and F. V. Hayden, of Washington; and Messrs. William Stimpson and Robert Kennicott, of Washington, were elected Corresponding Members.

Messrs. E. S. Tobey, Walter H. Cowing, and Joseph H. Allen, of Boston, were elected Resident Members.

Annual Meeting, May 4, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

The Annual Reports of the Treasurer, Librarian, and Curators, with the exception of those of Ornithology and Crustacea, were read and accepted.

The Librarian reported the addition of 75 volumes, and 126 pamphlets and parts of volumes since the last annual meeting. He called attention to the propriety of republishing deficient numbers of the Journal and Proceedings.

The principal addition to the Geological department

is the valuable collection of Zeuglodon vertebræ, deposited by C. S. Hale, Esq. of Burlington, N. Jersey.

The principal addition to the Ornithological department is the collection sent by Dr. Reinhardt, of Brazil, numbering over 340 specimens.

An alphabetical catalogue of the genera and species has been made in the collection of Radiata.

The department of Comparative Anatomy contains 693 specimens, viz: 257 crania, 88 skeletons, 172 parts of skeletons, 123 wet preparations, 43 skins, and 10 dried preparations. Many of these are packed away for want of room for their proper exhibition; and most of the valuable specimens are more or less covered with fungoid growths which penetrate and destroy the organic parts of the bones; these growths are caused by dampness and want of light and ventilation, unavoidable in the present state of the building. It is hoped that the future growth of these fungi may be arrested by an acid and alcoholic solution of corrosive sublimate, strychnia and camphor, and that the dampness may be absorbed by chloride of calcium.

In the department of Entomology, the Harris collection makes a most valuable addition.

The Microscopic cabinets, containing the Bailey collection, and that of the late Dr. Burnett, (between 200 and 300 animal parasites,) are in good condition and well arranged. The numerous drafts upon the crude material have so diminished the original amount, that their further consumption must be limited to special and important purposes connected with microscopic researches.

Dr. A. A. Gould presented the report of the nominating committee for officers for the ensuing year, which was

accepted. Drs. Bacon and White were appointed Scrutineers, and the following officers were elected:—

PRESIDENT,

Jeffries Wyman, M. D.

VICE-PRESIDENTS,

Charles T. Jackson, M. D. D. H. Storer, M. D.

CORRESPONDING SECRETARY,

Samuel L. Abbot, M. D.

RECORDING SECRETARY,

Samuel Kneeland, Jr., M. D.

TREASURER,

Amos Binney.

LIBRARIAN,

Charles K. Dillaway.

CURATORS,

Thomas T. Bouvé,	*Of Geology.*
John Bacon, M. D.,	*Mineralogy.*
Charles J. Sprague,	*Botany.*
Thomas M. Brewer, M. D.,	*Oölogy.*
Henry Bryant, M. D.,	*Ornithology.*
Thomas J. Whittemore,	*Conchology.*
J. N. Borland, M. D.,	*Herpetology.*
F. W. Putnam,	*Ichthyology.*
Theodore Lyman,	*Radiata.*
J. C. White, M. D.,	*Comparative Anatomy.*
Samuel H. Scudder,	*Entomology.*
Albert Ordway,	*Crustacea.*
Silas Durkee, M. D.,	*Microscopy.*

CABINET KEEPER.

Charles Stodder.

Prof. William B. Rogers stated the results of his examination of the Japanese Vegetable Wax lately presented to him by Henry A. Peirce, Esq. of Boston, and to which reference was made at the last meeting. This substance has the whiteness and apparent purity of bleached beeswax, from which, however, it differs in various particulars both as to mechanical and chemical relations.

At ordinary temperatures this vegetable wax is more brittle and less ductile than beeswax and breaks with a smoother and more conchoidal fracture. Its specific gravity is slightly less, and its melting point, about 127°, is more than 20° lower than the temperature at which beeswax becomes liquid.

Like the latter substance this vegetable wax is separable, by alcohol, into three fatty bodies, of which one is soluble in the liquid at ordinary temperatures, another only in hot alcohol, and a third is insoluble in it at any temperature. An experiment made to determine the proportion of these ingredients in the vegetable wax gave the following result, in round numbers, in 100 parts :—

Soluble in cold alcohol (Temp. 60°)	12 parts.
Soluble only in hot alcohol,	55 "
Insoluble in alcohol,	33 "

According to Brodie, beeswax similarly treated with alcohol yields only four or five per cent. of matter which is soluble in the liquid when cold, and twenty-two per cent. which dissolves in it when boiling, while the remainder amounting to nearly three-fourths of the whole weight is entirely insoluble in this liquid. Of these three ingredients called respectively Cerolein, Cerotic Acid and Myricine, Brodie found the two former, viz : those soluble in cold and hot alcohol, to have the character of fatty acids, while the third or Myricine proved to be a neutral fat, compounded of Palmitic Acid and a fatty base. The three corresponding substances isolated by alcohol from the vegetable wax, differ from these in some of their physical properties, and may, on closer examination, be found to consist wholly or in part of distinct and perhaps new fatty bodies.

The substance separated by alcohol at the common temperature is a soft, scarcely solid fat, which becomes entirely fluid at about 106°. With solution of litmus it exhibits quite a strong

acid reaction. The corresponding extract from beeswax, the Cerolein of Brodie, fuses at about 85°, and shows a much feebler acidity.

The ingredient dissolved from the vegetable wax by hot alcohol and separating from the solution as it becomes cool, when collected by filtration and thoroughly washed in alcohol at 60°, was found to have its fusing point at 134°, and to become as liquid as oil at 136°. This substance dissolves readily in alcohol many degrees below boiling. The solution affords with litmus no trace of acid reaction. The corresponding educt of beeswax, the Cerotic Acid, has a much higher melting point, is less soluble, and is distinctly acid.

The solid residuum from which the hot alcohol had ceased to extract anything more, being dried and strongly compressed between folds of blotting paper was found to adhere together very imperfectly, and to be much more brittle than the original wax. Its melting point is about 130°, and at 132° it becomes entirely liquid. The corresponding ingredient of beeswax, consisting chiefly of Myricine, melts, according to Brodie, at 147°.

It thus appears that the vegetable wax under consideration differs from beeswax not only in the proportions of its ingredients as separable by alcohol, but in the physical characters of these corresponding substances, the composition and chemical properties of which can only be determined by a thorough investigation.

In regard to the economical applications of this vegetable wax it may be added that the great readiness with which it is saponified, and the clear and strong light which it yields when burned in the form of candles, give promise that it may ere long become an article of considerable commercial importance.

Dr. C. T. Jackson confirmed the above experiments of Prof. Rogers, and stated that ether extracts a hard dry wax, after alcohol has extracted all that it can; the fat extracted by boiling alcohol is deposited on cooling, so that the alcohol can be used economically over and over again in the process. When dry distilled, a fatty matter passes over, and a tarry matter is left behind. The Japanese make this wax by boiling water; he experimented on wax made by himself from the berries.

Prof. William B. Rogers presented to the Society some masses

of Infusorial earth from the Tertiary strata of Virginia and Maryland, and gave a description of the geological and other conditions in which this and the associated deposits exhibit themselves in and near Richmond in the former of these States.

The Tertiary formations which underlie the wide plain extending from the seaboard to the eastern margin of the granitic and gneissoid rocks, approach their termination along this meridian in a series of strata which are separated by only a short interval from the irregular granitic floor. A little further toward the west they reach their boundary, partly by a rapid thinning away and in part by abutting along the hill-sides against the indented shore of these ancient rocks, here rising to the level of the general upland surface.

In the deep ravines leading into the valley of Shockoe Creek, especially on its western side, we meet with several extensive exposures of the Tertiary strata, one of which embraces nearly the whole thickness of both the Eocene and Meiocene formations as locally developed in this neighborhood. In all these localities the *infusorial deposit* is found occupying a position immediately above the upper limit of the Eocene strata or separated from it by a thin layer of whitish or of more or less ferruginous clay. Like the associated beds, it fluctuates in thickness as traced from one neighboring exposure to another, varying from twenty to upwards of thirty feet at the different localities on the north side of the valley, and presenting, where measured some years ago, on the opposite or Church-Hill side, a thickness of nearly fifty feet. In addition to the microscopic fossils, which in a more or less perfect condition make up so large a portion of the mass, this deposit presents a few casts of shells of well known Meiocene forms, of which the Astarte undulata may be mentioned as of most frequent occurrence. It also contains imperfectly preserved remains of a slender creeping plant, as well as fragments of woody stems and branches flattened and converted into lignite and in some cases filled in all directions with the perforations of a Teredo.

The material of the Infusorial stratum is generally of a very fine texture, admitting of being bruised between the fingers into an almost impalpable powder, singularly free from gritty particles. Although usually of a light gray, almost white color,

it includes in some localities layers of an ashy tinge, which are, however, not inferior to the rest of the deposit in the abundance of their minute organic forms. It has throughout a tendency to lamination in a horizontal direction, and toward its upper limit this structure is so distinct as to cause it readily to separate in thin crumbly plates. But of all its mechanical peculiarities its great lightness is the most characteristic. From experiments made many years ago, Prof. Rogers found that when pure and quite free from moisture this material in its ordinary state of compactness has a weight only one third as great as an equal bulk of water. The minute siliceous fossils for which this deposit has long been noted, belong, as is well known, almost entirely to the family of Diatomaceæ, and include a very large proportion of Coscinodiscus and allied forms, whose exquisitely thin plates lying in parallel positions in the mass have probably contributed to the laminated structure before referred to. The number of such frustules and other siliceous skeletons in each cubic inch of the pure material can only be reckoned in millions, and a cubic foot would contain a multitude far exceeding in number the entire human population of the globe.

The following description of the series of strata as exposed in the principal ravine before referred to, will serve to illustrate the relation of the Infusorial deposit to the others with which it is associated, and will at the same time illustrate the nature and fossil contents of these Eocene and Meiocene strata.

1. The lowest bed, which is seen resting directly on a soft sandstone and conglomerate, consists of a mixture of sand and clay having a yellowish gray color occasionally mottled with brown, and including little irregular patches of green sand. This stratum is crowded with the impressions of Turritella Mortoni, Cardita planicosta, and other well-known Eocene forms, which are, however, so fragile as scarcely to admit of being preserved. The thickness of this bed varies from six to ten feet.

2. Next above we find a stratum of dark olive or greenish clay mixed with siliceous sand and containing diffused granules and smaller particles of green sand. This bed abounds in the teeth of squaloid fishes, especially of the genus Otodus and Odontaspis, and with Coprolites, mostly small and apparently derived

from fish. Along with these are innumerable casts of Eocene shells, Carditas, Turritellas, Crassitellas, Cythereas, &c. Where it adjoins the subjacent mottled stratum the transition is marked by a thin ferruginous band crowded with impressions of Turritella, &c., which are deeply stained with oxide of iron. This subdivision, where thickest, has a depth of about twelve feet.

3. Resting upon the dark stratum just described is a second arenaceous bed of a light yellowish tint mottled with brown and varied by thin ferruginous layers. This also contains numerous impressions of shells. Some distance up the ravine it exhibits a thickness of about eight feet, but is seen irregularly thinning out toward the lower end of the hollow, where its upper surface bears marks of irregular denudation prior to the deposition of the overlying Meiocene deposits.

4. At the base of the Meiocene strata we find a thin bed of whitish and sometimes ochreous clay mingling towards the top with the lighter material of the *Infusorial stratum*, which here attains a thickness of from twenty to thirty feet. It is this locality that twenty years ago furnished Prof. Rogers the first specimens of Tertiary Infusorial earth discovered in the United States, and led him to the recognition of a similar deposit in the Tertiary of other localities in Virginia and Maryland, which, like that of Richmond, have since become so familiarly known to microscopic observers in all parts of the world.

5. Above the Infusorial stratum, here forming a bench often denuded and in such cases conspicuous from its whiteness, we find a series of strata consisting of various intermixtures of clay and sand, of which the lowest is usually a compact, light colored clay, the next a bluish or grayish, more arenaceous mass, and the uppermost an argillaceous stratum of a light brown and mottled appearance. The highest of these Meiocene strata is overlaid by a deposit of coarse gravel such as forms the usual superficial material of this region in the vicinity of the large rivers. The thickness of that part of the Meiocene which lies between the Infusorial stratum and this surface deposit, amounts, in the neighborhood of the present section, to about twenty-five feet, but at other points where less reduced by denudation it displays a considerably greater mass. Throughout most of these beds the casts of well-known Meiocene fossils are of very frequent

occurrence. Indeed, in some of the layers they are so numerous as to be exposed to view in every mass of the sandy clay which is broken or falls to pieces by its natural partings. Among the most common of these fossils are Fusus quadricostatus, Panopæa reflexa, and many Meiocene species of Pecten, Arca, Crassitella, Cytherea, Venus, Astarte, Turritella, &c. In the lower dark-colored stratum there occur stems of woody plants, which, from microscopic indications, seem to have been coniferous, while in the argillaceous layers both beneath and above, Prof. Rogers has from time to time discovered prints of the leaves of Dicotyledonous plants.

In none of these deposits, whether of Eocene or Meiocene age, do we meet with any remains of the shelly matter which at one time must have formed so large a portion of the mass. In various parts of the Tertiary region where the strata, as in the present case, disclose only the casts, or as it were spectres of shells, the sands and clays are more or less impregnated with sulphuric acid, and present in some of their lower layers diffused particles and even large and well-formed crystals of sulphate of lime. We can therefore have little hesitation in referring the disappearance of the shelly matter throughout this district to the infiltration through these fossiliferous strata of water charged with sulphuric acid, which, gradually transforming the carbonate of lime into sulphate, carried this product downward to be accumulated and crystallized in the lower layers, at the same time leaving the moulds and casts of the shells in so perfect a state as to enable us to trace even their more delicate processes and markings.

The position of these beds along the western margin of the Tertiary plain must be regarded as marking the general direction of an ancient shore line; and the frequent presence of fragments of terrestrial plants in these Tertiary sediments is confirmatory of this view.

It has already been stated, in describing the section on Shockoe Creek, that the lowest layer of the Tertiary is seen in that locality resting upon a soft sandstone and conglomerate. This subjacent deposit shows itself in a like position at several neighboring points, and is evidently the thinning away of a formation, which, farther toward the east, separates the Tertiary from the granite by a

much wider interval. As seen in the extensive exposures on the James River for many miles below Richmond, this formation presents a very close agreement with the soft sandstone found on the Rappahannock and Potomac rivers in corresponding positions, and like this has been long since referred by Prof. Rogers to the upper part of the group of Mesozoic strata to which the coal measures of eastern Virginia appertain.

Prof. W. B. Rogers presented, in the name of his brother, Prof. Henry D. Rogers, his extensive and completed work on the Geology of Pennsylvania, and the general Geology of the United States, with maps and illustrations executed in the highest style of art.

The thanks of the Society were voted for the donation.

Mr. Joseph B. Stearns, of Boston, was elected a Resident Member.

The Annual Meeting was adjourned to the next regular meeting.

May 18, 1859. *Adjourned Annual Meeting.*

Dr. C. T. Jackson, Vice-President, in the Chair.

The following communication from Mr. William P. Blake, of Dahlonega, Ga., was read by the Secretary:—

"OBSERVATIONS ON THE MINERAL RESOURCES OF THE ROCKY MOUNTAIN CHAIN, NEAR SANTA FÉ, AND THE PROBABLE EXTENT SOUTHWARDS OF THE ROCKY MOUNTAIN GOLD FIELD."

As the discovery of gold in quantity in the western part of Kansas renders any information which may be given upon the mineral resources of the Rocky Mountain region particularly interesting at this time, I am induced to send to the Society a brief notice of some of the results of a tour of exploration made

in 1857, in the mountains of the northern part of New Mexico, near Santa Fé.

The vast extent of country in New Mexico, which remains unexplored, precludes the possibility of presenting even a fair outline view of its mineral resources as a territory. The few facts which I offer must therefore be regarded only as an addition to what has already been discovered, and an indication of what yet remains to reward the labors of the diligent explorer.

First in interest at this time, as bearing upon the extent of the Rocky Mountain gold field, is the gold field of New Mexico, which has been known and worked since 1828. It is confined to the Placer or Gold Mountains, about twenty miles from Santa Fé, towards Albuquerque, and although worked continuously since its discovery, its limits have not been extended by exploration far from the place where the gold was first found. The yield of gold has been chiefly from the placers or washings, and not from veins, and was estimated by Wislizenus, in 1847, to vary from 30,000 to 250,000 dollars a year; but it soon after greatly diminished, until counted by hundreds rather than thousands.

I found these placers to be on the slopes of subordinate or outlying ridges of the eastern ranges of the Rocky Mountain chain, and to be true hill-deposits, affording coarse gold like that from the high placers of California. The "pay gravel" lies deep below the surface, from twenty to sixty, and even one hundred feet, and is generally very rich. Owing to the almost total absence of water, mining and washing have been but imperfectly conducted, and a larger amount of gravel remains untouched. The Mexicans sink circular shafts, like wells, through the soil and alluvions to the gravel, then tunnel upon the bed-rock and take the good gravel to the surface in sacks, cart it two miles to water, and then pan out the gold in wooden bowls or *batéas*. In the winter, water is sometimes obtained by melting snow with heated stones. There are two principal placers, the "Old" and the "New," and at the former there is a small stream or rivulet for a part of the year. These placers are about five miles apart, but there has been very little prospecting to determine their real extent. New Placer is known to be about ten miles long, for the workings or pits have extended over that distance. The gold

appears to have washed out of two cañons in the mountain which are near together, and appear to drain but a very small part of the surface. Veins or beds, in the rocks, containing gold, outcrop higher up in the ravines of the mountain. It is remarkable that in one place, at least, gold occurs in strata of quartzose sandstone, probably of the age of the carboniferous, and in great ferruginous beds, rather than in veins. The sandstone appears to have been charged with auriferous pyrites by the decomposition of which gold has been liberated. At other points regular quartz veins bearing gold and pyrites are found, and some of them have been worked at different times for over twenty years. The *Ortiz Mine* has been worked to a depth of one hundred and thirty-five feet, and levels driven for nearly two hundred yards on the course of the vein which is represented to be about six feet thick. The Biggs' Mine, which adjoins it, has been worked to nearly the same depth. In the mountains known as *Los Cerillos*, about eight miles from New Placer, there is a deserted mine, known among the old Mexicans as *La Mina del Oro*, the true character of which could not be well determined. It certainly is very ancient, and there is no record or tradition concerning it, except that the work was done before the Insurrection, which took place in 1680. The principal shaft is over two hundred feet deep, and is cut vertically, with great precision, through solid rock. The sides are very smooth, and it is evidently the work of experienced miners. A stone, allowed to drop vertically, does not reach the bottom for several seconds, and then gives a dull sound as if striking earth, showing that there is no water in the mine even at that depth. There are two other shafts, and they all communicate by galleries in miners' style. In 1834, there was an attempt made to clean out the mine and work it, by a party of Mexican residents of Santa Fé, but without any success, there being no water at the mine or machinery for raising and reducing the ore.

At the placers, large lumps, pepites or nuggets, of gold have been frequently found; the largest, of which I could get reliable information, was worth about $2000, another was valued at $1800, and there have been many worth from fifty to eighty. At Old Placer, none larger than about eighty pennyweights had been found. The gold from New Placer is remarkably black

and ill looking on the surface, but is very fine, being worth twenty dollars an ounce. Only sixteen dollars an ounce is paid for it to the Mexicans at the mines by the traders. When these miners are employed by the day they receive from sixty to seventy-five cents.

The Gold Mountains and Placers are about three hundred miles south of Pike's Peak, and there is little reason to doubt that gold will be found at intervals, if not in an almost continuous belt, over this entire distance. The New Mexican gold field is probably much more extensive than is generally supposed, and when it is thoroughly prospected many more rich placers will doubtless be found. The geological indications in the mountains north of Santa Fé, judging from specimens brought to me, are favorable to the presence of gold, and are more like the auriferous rocks of other gold regions than the formations at the Placer Mountains.

The observation of the occurrence of gold in beds of sandstone is not only interesting to science but of considerable practical importance. The erosion, or breaking down of such a bed, would supply gold to a stream or deposit without its being accompanied at the same time by the usual beds of quartzose gravel, the soft friable sandstone being completely broken up into sand by attrition. Thus, rich deposits may exist on the hill-sides without any indication of their presence by beds of rolled gravel or broken fragments of veins on the surface. Mr. Green Russell, an experienced placer miner and mountaineer, who made an extended tour through the new gold region of western Kansas last year, informs me that he has observed such conditions; having found rich deposits of gold without much gravel, and scarcely any quartz. From the same authority, I learn that gold occurs in considerable quantity upon the Arkansas River, in extremely thin scales, as low down as the crossing of the old Santa Fé road, near old Fort Atkinson. This is far out upon the broad plains, and below any coarse alluvions. The quantity of gold increases as the river is ascended, and the best prospects were obtained at the Pueblo above Bent's Fort. The Arkansas, near this point, has several forks or branches heading in the mountains to the southward, in the vicinity of the Spanish peaks, and there is much reason to believe that gold will be found there. A connecting link between

the New Mexican gold field and that of Pike's Peak would thus be formed. A sample of the Arkansas River gold, brought in by Mr. Russell, yielded .971 by assay at the Dahlonega Branch Mint, being worth about twenty dollars an ounce, or nearly the same as the New Mexican gold. It would thus appear that the Rocky Mountain gold is of superior quality, the average of the California gold being from .875 to .885, and the Australian .960 to .966.

Next to the gold, but probably of greater importance to the country, is the existence in the Rocky Mountain chain of beds of coal of the carboniferous period, corresponding in kind to those of the great Appalachian coal-field. Beds or layers of coal or lignite have at various times been reported to exist in the mountains, but their age or character was unknown, but supposed to be of a period more modern than that of the true coal. I was able to determine by an abundance of fossils, that the true coal measures are developed there, having found not only shells but fossil ferns identical with species found in the coal measures of Missouri and Ohio. Seams of bituminous coal and thick beds of black shales occur only one mile from Santa Fé, and at other places in the vicinity, and I have no doubt that explorations would detect valuable beds at various points north and south along the whole Rocky Mountain chain through New Mexico and Kansas into Nebraska and beyond.

Twenty miles from Santa Fé, and not far from the gold mines, there is a bed of hard coal, specimens of which I examined and found to be true anthracite or debituminized coal, apparently equal in quality to the anthracites of Pennsylvania. The presence of beds of anthracite coal in the Rocky Mountains is of great national importance in many points of view. One of the great questions in connection with the proposed construction of a railroad to the Pacific has been,—Where shall appropriate fuel be obtained? In these beds of anthracite coal we have a store of the most compact fuel known, at a point nearly midway between the Mississippi and the Pacific. Here, then, is one great reason for the construction of a central road to the Rocky Mountains near Santa Fé, coal not having been found, and probably not existing, in workable beds in the lower and porphyritic ranges of western Texas and southern New Mexico. Even if wood were

abundant in the mountains (which it is not, except at great elevations,) the coal is much more accessible and desirable. It is valuable not only for railway purposes, but to the inhabitants of the region, and is specially important for mining and metallurgical operations.

There is great reason to believe that the Rocky Mountain chain is rich in silver ores in the form of argentiferous galena. Stevenson's mines, near Franklin, (El Paso,) have long been known and are very rich. Although worked very irregularly, and the ores smelted in the rudest manner, large amounts of silver have been extracted, while the lead and copper which occur with the silver have been totally disregarded and thrown away. Similar ore is said to occur in the Sandia mountains, near Albuquerque, where there are very ancient but now deserted mines. In the group of mountains known as *Los Cerillos*, fifteen miles from Santa Fé, I examined two or three argentiferous veins, the principal minerals being galena and blende with copper and iron pyrites. These veins occur in a porphyritic rock and are very promising in their appearance. They have been worked upon slightly, and some of the excavations appear ancient. The Mexicans say they were made before the Conquest.

Of copper ores, there are several localities. Sulphuret of copper, with blue and green carbonates, occurs in the Placer mountains. Native copper and red oxide of copper are found near Jemez, in the valley of the Rio Grande. The specimens from this locality are peculiarly rich and promising, and much resemble the red oxide and native copper of Arizona, which occurs in such abundance.

Magnetic iron-ore, exhibiting polarity very strongly, is abundant in the mountains near the gold mines, and at some future day may be profitably worked for iron and steel, as coal and limestone are abundant in the vicinity. Specular iron is reported to exist in veins or beds, but whether it is abundant or not was not ascertained.

In addition to the useful metals and ores, there are many valuable minerals and gems. The much prized Chalchihuitl (chalchee-wee-tee) of the ancient Mexicans, held in the highest esteem by the Montezumas at the time of the Conquest by Cortez, was obtained in the mountains about ten miles from the gold placers.

This stone is a variety of turquoise, and the locality is the only one known in America. At Fort Defiance the Navajo Indians bring in rolled fragments of garnets, perfectly clear and transparent and of a most beautiful color, fully equal if not superior to those from Bohemia. Some of them are very large, and of considerable value. Beautiful chrysolites have also been obtained there; several specimens were shown to me in Santa Fé. Diamonds have been reported, but as yet there is no good reason to credit the statement.

It will thus be seen that the mineral resources of the Rocky Mountain region are extensive and of a character to render it in a great measure independent of distant sections of the country. Its rapid settlement and the explorations which must result from the great emigration to the newly discovered placers, will not fail to bring to light many new localities of valuable minerals, and thus hasten the organization of a new and powerful State.

Dr. Jackson observed, that the most natural geological route for a railroad to the Pacific, seemed to him from New Orleans by Texas and New Spain to Mazatlan; a great part of the Atlantic portion from Portland to New Orleans is already built; in Mexico and New Spain there is a great extent of level table-land,—such a route, along the coast of the Atlantic and the Gulf of Mexico, would be the shortest and most direct, not only from New England but from the region of the great lakes.

Dr. Jackson announced the decease of the celebrated and venerable Alexander Von Humboldt, at Berlin, in his ninetieth year. He alluded to the principal events of his life and of his scientific career; to his exact and extensive knowledge in every department of natural science; to his travels, in which he collected a vast amount of specimens and accumulated a mass of facts, which he arranged in the best possible manner from his comprehensive knowledge of natural science. His industry was untiring, and his information on general subjects of

natural science probably greater than that of any other man; he was the originator of the present system of magnetic observations, and first drew attention to isothermal lines, classifying countries by their climates; he collected an astonishing amount of facts in natural science, which have served as inexhaustible supplies for subsequent observers.

Mr. J. Hale Abbot alluded to the general literary culture, and to the remarkably well-balanced mind of Humboldt. Most men, eminent in science, he said, are one-sided in their mental constitution, but Humboldt cultivated his faculties in all directions, and the marks of a refined taste in literature, as well as of scientific culture, appear in all his writings. Hence the accuracy of his judgment, the trustworthiness of his conclusions on scientific questions, and the general unhesitating acceptance of his well-matured opinions.

Mr. Abbot presented the following resolutions, which were unanimously adopted:—

Resolved: That the members of the Boston Society of Natural History have learned with profound grief the death of the illustrious Naturalist and Philosopher—Alexander Von Humboldt.

Resolved: That we cherish a high sense of the preëminent amount and value of the services rendered by him to the cause of science, during a long life actively devoted to the extension and diffusion of knowledge of the phenomena and laws of nature.

Resolved: That, in token of our condolence, these resolutions be transmitted to the family of the deceased.

The Secretary made a communication from U. A. Boyden, Esq. of Boston, requesting the Society to consider the expediency of examining the so-called "ice stratum" in Brandon, Vermont, which has recently been referred to in the newspapers. In excavating a well, on a tolerably level plain, at a depth of fifteen feet through sand and gravel, the workmen came to a layer of frozen

coarse gravel interspersed with lumps of clear ice; since the digging of the well, the surface of the water, at the depth of thirty-five feet, freezes over every night.

Mr. Boyden offered to pay a considerable portion of the expense of a commission to examine the locality. The following gentlemen were appointed a committee to take charge of the subject, and make all necessary investigations: Messrs. Bouvé, W. B. Rogers, and C. T. Jackson.

The Curator of Entomology made a revised report of the collection of Insects belonging to the Society, and especially on the addition made by the purchase of the cabinet of the late Dr. T. W. Harris, and his valuable manuscripts.

The department of native insects in Dr. Harris's cabinet has a peculiar value as containing many typical specimens of species described by himself, Say, and other naturalists, and also from its completeness in all its parts. It contains—

4838	specimens	of	2241	species	of *Coleoptera.*
181	"	"	76	"	" *Orthoptera.*
620	"	of about	300	"	" *Hemiptera.*
267	"	of	146	"	" *Neuroptera.*
1125	"	"	602	"	" *Hymenoptera.*
1931	"	"	900	"	" *Lepidoptera.*
796	"	"	395	"	" *Diptera.*

In all, 9758 specimens of 4660 species. This does not include a considerable number of unclassified specimens. The cabinet is in good condition. The Curator suggested the purchase of his scientific library, rich in entomological works not elsewhere to be met with in this vicinity, and forming a most desirable accompaniment to his collections.

Mr. Stodder exhibited a specimen of polished encrinal limestone, from the vicinity of Davenport, Iowa.

Mr. F. B. Meek, of Washington, D. C., was elected a Corresponding Member.

The meeting, being an adjournment of the Annual Meeting, was again adjourned to the next regular meeting.

The Corresponding Secretary read the following letters, which he had recently received, viz:—

From Dr. C. W. Tuttle, April 19; W. P. Blake, Dahlonega, Ga., April 23; Dr. George Suckley, New York, May 11; and William Stimpson, Washington, May 11, in acknowledgment of their election as Corresponding Members; New York Lyceum, March 12 and 23; Zoölogisch-Botanischer Verein, Wien, March 15, 1858; Société de Geographie, Paris, Nov. 20, 1858; Bibliothekariat der K. Bayerischen Akademie, München, Dec. 29, 1858; Naturforschende Gesellschaft, Emden, Dec. 16, 1858; Verein für Naturkunde in Nassau, Wiesbaden, Dec. 1, 1858; Académie Royale des Sciences de Stockholm, Nov. 15, 1858, and William Sharswood, Esq., Philadelphia, March 15 and May 5, acknowledging the receipt of the Society's publications; the American Association for the Advancement of Science, March 26; Cambridge Philosophical Society, Nov. 1858; Verein für Naturkunde, Wiesbaden, Dec. 1, 1858, and the Académie Royale des Sciences de Stockholm, Nov. 15, 1858, presenting their various publications; Librarian of Bowdoin College, April 5, asking that deficiencies in their set of the Society's publications may be made good to them; H. Davis, McGregor, Iowa, concerning collections for the Society; and the K. Preussische Akademie, Aug. 12, 1858, acknowledging the receipt of the Society's publications, and presenting its own.

The following Standing Committees were announced as having been chosen by the Council:—

On the Library. Messrs. Dillaway, Sprague, and Bacon.

On Publications. Messrs. D. H. Storer, Dillaway, S. L. Abbot, Wyman, and Kneeland.

On Finance. Messrs. Bouvé, Barnard, and Binney.

June 1, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. Charles Stodder read portions of a letter, dated May 23, from Brandon, Vt., in reference to the frozen well recently opened there :—

The well is near the foot of a hill, about half a mile from Otter Creek, on its eastern side, and on the eastern slope of the hill. The hill appears to be composed mainly of coarse gravel, and from its summit about half way down has a steep pitch, below the middle, sloping very gradually to the sand plain on which the village of Brandon is located. The well was dug in November last, from 30 to 35 feet deep, all the way through clear gravel varying in size from a nut to an egg. At the depth of 15 feet a mixture of gravel and ice was reached, which extended 15 feet more in depth, and below this the water was found, the clear ice above the water being about two inches thick; the water freezes over if it is left undisturbed 12 hours, and the sides of the well, for a considerable distance above the water, sparkle with frost.

Dr. Jackson observed, that a frozen well at Owego, N. Y., is described in Vol. 36 of Silliman's Journal; and also another near Hartford, Ct., in the Proceedings of the American Association for the Advancement of Science, at the meeting in Providence, R. I., in 1855.

Mr. John H. Blake was added to the Committee on the investigation of the Brandon Well.

Dr. Brewer remarked, that at a previous meeting (see p. 21 of the Proceedings, Vol. 7,) he said, on what he believed good authority, that a specimen of Bachman's finch (*Peucæa æstivalis*, Cab.) had been shot in Berlin, Mass; subsequent examination of the bird proves it to be Henslow's bunting, (*Coturniculus Henslowi*, Aud.,) a

species whose northern limit has been generally supposed to be the latitude of Washington, while Bachman's finch is not known to come so far north even as that.

Dr. C. T. Jackson presented specimens of casts of *Paradoxides*, from Braintree, Mass., and from St. Mary's Bay, Newfoundland; both of which seem to be the *P. Harlani.*

The rock which contained the latter specimen is water-worn and boulder-like, weighing between 2 and 3 cwt.; it is a dark blue calciferous slate, consisting of about $\frac{1}{3}$ carbonate of lime. The specimen lies across the line of stratification, instead of in it, and consequently the head appears crushed, somewhat injuring its symmetry. The dimensions are,—

PARADOXIDES HARLANI?

	St. Mary's Bay.	Braintree.
Length	10 inches	8½ inches
Width	5 "	4 "
Articulations	20	20
Width of body	1½ "	1¼ "
Width of ribs	1 inch	1¼ "
Number "	24	24
Lateral appendages	1 inch	1 inch

Head compressed by shrinkage of strata.

Dr. Jackson observed, that he long ago expressed the belief that the borings, which have been extensively made in Maine, in the vicinity of Pembroke, in search of coal, would prove fruitless. A Portland company are, however, actively engaged in the search, and he had recently received specimens of the rock containing apparently stems of *fucoides*, fern-like impressions, and others resembling the markings of *lepidodendra*, which had somewhat shaken his former opinion.

Mr. Theodore Lyman gave an account of the habits of some animals recently observed by him at West Yarmouth, Mass.

Syngnathus Peckianus.—Pipe-fish. Taken in shallow water among dead eel-grass and sea-weed. Has a most extraordinary power of moving its eyes, the balls of which may be turned until,

instead of lying parallel to the length of the body, they stand at an angle of at least 50° to it. Moreover, the balls are usually moved independently of each other; and the two seldom have the same position. They move continually and in short jerks, and, as they stand well out from the head, their range of vision must be great. The movement of the body proper is somewhat like that of an eel, but rather stiffer and less rapid. It moves by vibratory undulations of the dorsal fin, running from the front backwards, while at the same time, the small pectorals vibrate with great rapidity. When at rest, the dorsal fin is laid down on the back. When alarmed, it vibrates its fins and wriggles the body forcibly.

Atherina notata.—Sand-eel. A beautiful silvery sardine. Running in small schools, on a clean sandy bottom, and in only a few inches of water.

Fundulus pisculentus. The commonest fry hereabout. Plenty in all the marsh ditches and runs.

Hydrargira flavula. Basse fry. A striped little fish; not seen in great numbers.

Cyprinodon ovinus. Small thick minnow. Not common.

Alosa vulgaris. Taken in seines; crammed with spawn.

Spinax acanthias. Taken in great numbers on the bar, filled with young. Also said to be breeding in the autumn.

Platyonychus ocellatus. Sand crab. Very abundant in shoal water with sandy bottom. They are very quick and ferocious. When pursued they retreat sideways; but, if hard pressed, they suddenly back under the sand. When taken they bite and struggle fiercely. The females were charged with eggs, already segmented.

Libinia canaliculata. Common among the weeds in shallow water. Often of great size. Very sluggish and stupid. It moves *forward* slowly, and, if taken, makes little attempt to defend itself. Always seen in the neighborhood of any dead animal, on which it feeds, in company with *Buccinum obsoletum.* No eggs seen.

Palemon vulgaris [?]. Gliding about in ditches in large numbers. Sometimes they threw themselves forward with a sudden jerk.

Eupagurus pollicaris. Abundant in shallow water, on the beach. Lives generally in shells of *Pyrula* or of *Natica.* In respect to the organs of the mouth, which continually vibrate when

the animal is active, they are, 1st. The tip joints of the palpi of the 5th and 6th pairs of jaws. 2d. The whole of the 3d pair of jaws; each of which is in the form of a lobed, flattened, and almost membranous plate, and, of this the true jaw moves rapidly in a lateral direction, while the palpus, lying horizontally just at the mouth of the branchial chamber, flaps briskly up and down to renew the water for respiration. 4th. The interior pair of antennæ alternately nod up and down. By all these motions a series of currents is kept up. The interior antennæ and eyes are occasionally brushed with the larger pairs of jaws, somewhat in the manner of a fly. The fifth pair of legs on the body are used to clean out the branchial chambers. They are, from time to time, thrust into the branchial chamber from behind, and are there moved about and then withdrawn. The females had segmented eggs, carried in a bunch on the left side of the tail.

Gelasimus vocans. In immense numbers, both in ditches and on flats of damp sand, where they make holes. Some were digging these holes, and the work seemed chiefly done by the males, who, indeed, appeared more active than the females. In beginning the hole, they simply thrust their legs into the sand and then crowd themselves in sideways; but, when the hole gets deep, they bring out armfuls of sand, which they leave near the mouth, and then return for more. Some seemed to collect bits of sea-weed, &c., to line their burrows with. The legs used in digging and in carrying the sand were the four on the side of the body opposite the big claw. They always went into the burrow with the big claw last. In walking, two alternate legs on a side are moved simultaneously. There were generally a male and a female in each burrow. The males had a singular habit of rearing up for a moment on their hind legs, and holding up their claws and other legs as high as possible, as if to enjoy the breeze. Saw none fight, except one male, who tried for a long while to get another out of his burrow, by seizing him with his big claw and dragging him with all his might. No females with eggs noticed.

Pilumnus Harrisii [?]. Among sea-weed, &c., in shallow water; pretty abundant. No females with eggs seen.

Eupagurus longicarpus. In little shells.

Idotea cæca [?]. Little isopod, brown-olive or bright green. Among sea-weed in plenty.

Melampes (Conovulus) *bidentatus* [?]. In great plenty on seaweeds and marsh grass along the ditches.

Crepidula fornicata. In great numbers on old shells, generally those occupied by Eupagurus; the smaller are often sticking to the larger. The expanded animal has two snail-like horns with eye-specks at their bases, and, between them, a pair of lobes (tentacles?) The front part of the body and head have the form of a rather thin plate of tissue, which is very movable; while the sucking-disk rests on the "step" in the shell, and is very thick and muscular; the front edge of the disk is prolonged, in the shape of a movable flap. Round the edge of the shell runs the mantle, which may be considerably contracted. The gills lie, in a sheet, on the inside of the roof of the shell. The crepidulæ were laying eggs, which adhered in clusters to the surface on which the animals lay. These clusters contained a bunch of transparent sacs, each of which was full of embryos. These embryos, before leaving the sac, have an active motion. They take on the form of little bags tied, as it were, near the top; the bag itself is filled with yolk-cells, while the loose flaps above the constriction, are bordered by rows of vibratile cilia, which create brisk currents and serve to move the embryo. When the *crepidula* is at rest the front edge of the shell is a little raised and the tentacles thrust a little forth. They move slowly from time to time.

Pecten concentricus.—Scallop. In shallow water on a sand bottom. Lies usually with its valves but little open; but, from time to time, it slowly opens its valves quite wide, as if gaping, and then shuts them with a sudden clap, squirting the water in all directions. The eye-specks, in a good light, shine with a green metallic lustre. The gills, which are very delicate, may be contracted, by transverse muscles, like a ruff, or they may lie flat and extended. The mantle, at the edge, is turned up, so as to hang down from each valve, like a little veil. On the edge of the mantle are numerous fringes, while next the margin of the shell are eye-specks and a double row of very short, bead-like fringes. The liver is very dark green. A single very stout adductor. No eggs noticed. The color of the shells varies from bright orange through brown orange to brown, white with brown markings, and lemon colored.

Buccinum obsoletum. In myriads on the flats, &c. Very plenty on dead fish, &c.

Natica heros. Apparently not so plenty as *N. duplicata*, which is the more southern species.

Pyrula canaliculata.—Wrinkle. This is about the northern boundary of this species. It goes to Charleston, S. C., to Florida, &c.

Mya arenaria, is sometimes cast alive, by the tide, into ditches.

Polynoe. Found among sea-weed. The scales on the back come off very easily.

Hydractinia, in great beauty and plenty. Incrusting such dead shells as *move*; i. e., those of hermit-crabs. There were observed medusæ buds on them.

Dr. Kneeland presented a specimen of *Cordiceps Carolinensis*, from West Roxbury, Mass., in which the fungus, two inches long, grew from the under surface of the caterpillar between the head and the first segment of the body. Also specimens of the apple and peach borer, from Littleton, Mass.

Mr. Stodder read a paper from Mr. Arthur M. Edwards, of New York,

ON THE DIATOMACEOUS FORMS CONTAINED IN A PEAT MARL FROM MILWAUKEE, PRESENTED TO THE SOCIETY ON MARCH 16, 1859.

Having been requested by Charles Stodder, Esq., to make a microscopical examination of a specimen of "Peat marl," from Milwaukee, I herein present the results :—

The marl is of a gray color, and much charged with calcareous matter, resulting from the freshwater shells deposited with it, many of the smaller species of which still remain entire. On acting on it with strong boiling nitric acid, everything is dissolved, except the silica present either as sand or the shells of Diatomaceæ, leaving an almost colorless residue. When this is examined by means of the microscope it is found to consist, for the most part, of the remains of freshwater Diatoms, associated with sand and spicules of freshwater sponges in small quantity. This marl is apparently of recent formation, and belongs to the class of deposits in the course of deposition at the bottom of all our ponds and lakes.

An extensive layer of similar material was lately brought to light at Baisley's pond, about two and one half miles from the town of Jamaica, on Long Island. About *two millions of square yards* of this peat were thrown out at this place, and it consists, for the most part, of one species, *Himantidium arcus.*

A similar deposit was discovered by the late Professor J. W. Bailey, at West Point, New York, and specimens have been received from Bemis' Lake, N. H. The discovery of these deposits confirms the opinion of Professor Bailey, expressed at the time of the finding of the West Point layer, that similar ones are to be found under all our ponds and marshes. The species found in the Milwaukee marl are all common freshwater ones, and are as follows :—

Amphora ovalis,
Cocconeis placentula,
Cocconema cymbiforme,
" *cystula,*
" *lanceolatum,*
Cyclotella Kützingiana,
Cymatopleura elliptica,
Cymbella cuspidata,
Epithemia gibba,
" *granulata,*
" *turgida,*
Fragilaria capucina,
Gomphonema acuminatum,
" *constrictum,*
" *dichotomum,*
" *vibrio,*
Himantidium bidens,
Navicula affinis,
" *cuspidata,*
" *firma,*
" *inflata,*
Nitzschia linearis,
Odontidium mutabile,
" *tabellaria,*
Pinnularia acuta,
" *oblonga,*
" *viridis,*
Stauroneis phœnicenteron,
Surrirella nobilis,
Synedra capitata,
" *longissima.*

Making in all 31 species, of which the following are common in this deposit :—

Cocconeis placentula,
Cocconema cymbiforme,
" *cystula,*
Epithemia granulata,
Epithemia turgida,
Gomphonema constrictum,
Pinnularia oblonga.

The two species, *Cymatopleura elliptica* and *Surrirella nobilis,* were only found in fragments.

Mr. Stodder alluded to Diatoms found by him at the Cambridge brickyards, in which distorted specimens seemed to be the rule instead of the exception.

M. A. Daubrée, of Strasburg, and M. A. Delesse, of Paris, France, were elected Honorary Members.

June 15, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. T. Jackson, for the Committee on the frozen well at Brandon, Vt., read a report by Mr. Blake and himself, as follows:—

Your committee, appointed to examine the frozen well in Brandon, Vermont, have attended to their duty, and beg leave to report progress. On the 10th of this month, two members of the committee visited Brandon, and made their researches on that day, and on the 11th inst. They examined the persons who saw the well dug, and the owner of the property, and learned all the facts known to those parties. They also made as thorough a geological examination of the locality and its vicinity as was in their power, during this short visit, surveyed the premises, experimented on the temperature of the water of the well in question, and on that of the neighboring springs and wells, and made arrangements for further researches. In this examination of the locality, the committee were aided by Messrs. Palmer, Wiggins, and Strong, of Brandon; the people of the village manifested much interest in our researches, and offered to aid us in future operations.

The frozen well is situated about half a mile west of the Brandon House, on the side of a moderate elevation which is called the Hogback by some people, and Prospect Hill by others. It is on the estate of Abraham Trombley, and was dug in November, 1858.

From persons who were present when the well was sunk, we

learned that after sinking through the soil, about twenty feet, they came to frozen earth, consisting of coarse gravel, rounded pebbles, and lumps of clear ice, from the size of an egg to that of a twelve pound cannon-ball, and that this frozen stratum was between twelve and fifteen feet in thickness. Mr. Strong, one of the nearest neighbors, who saw the well every day, brought lumps of the frozen gravel to the village, and showed them to his friends.

During the past winter and spring, this well has given Mr. Trombley much trouble, owing to its freezing over every night, so that he was obliged to send his boy down in the bucket to cut through the crust of ice, in order to be able to draw water for family uses. This boy has become so expert in this service, as to be quite useful to the committee; and he readily went down into the well for us, and cut off the ice from its sides, while we were making our examinations.

We sent down a candle and illuminated the well, so as to see the crust of ice on its sides, where he had broken it off with the hammer, and drew up the pieces of ice in the bucket. We found that this crust extends from the surface of the water, which is 2½ feet deep, to the height of five feet, and is of considerable thickness.

The water which supplies the well comes in from three different directions, under the frozen stratum, and the sand at the bottom of the well is not frozen, and water was free in it when the well was first sunk.

The water which spatters up against the sides of the well, and that which runs down from above, freezes on its sides near the bottom, showing that the temperature there must be considerably below the freezing point of water, for thawing ice could not freeze water of a more elevated temperature.

On drawing buckets of water from the well, and immediately taking its temperature with well proved Centigrade thermometers, of which we had three, we found that the temperature of the water from the well was ½° Centigrade, while the air in the bottom of the well stood at 2°, and the outside air at the surface stood at 9½° C. These experiments were several times repeated, with the same results. We next made an examination of the nearest wells and springs in every direction around this well. A

spring, which comes to the surface a few rods northwest from the well, has a temperature of 11° Cent. Mr. Strong's well, a few hundred yards to the north of it, is 15 feet deep, and the water drawn from it had a temperature of 8° Cent. Mr. Clarke's well, in a field a few hundred yards from the gravel bed, had a temperature of 6° on the 11th of June, that of the atmosphere at the time being 7°. This well is 19 feet deep, and was sunk in sandy soil. A spring, a few hundred yards southwest from Trombley's, had, on the 11th, a temperature of 9° Cent., that of the air being 9½° Cent. These springs and wells are on opposite sides of the frozen well, and show that they are not influenced by the cold stratum, which, so far as we can learn, is quite limited. Its precise extent we do not yet know, and it will be subjected to further researches, by digging or boring into the soil in the vicinity.

Mr. Trombley's well is 34 ft. 4 in. deep, and has 2 ft. 4 in. of water in it. The diameter of the well is about three feet; it is stoned up properly with rounded bowlders of limestone, and has a curb around the top; a marble slab, with a circular hole eighteen inches in diameter through it, covers the well, while the windlass is covered with a roof made of a couple of boards nailed together to keep the rope from exposure to the weather. These coverings, of course, stand in the way of radiation of heat from the bottom of the well into space, hence the cold cannot arise from radiation of heat. This we have directed to be proved, by covering the well closely with blankets. Mr. Wiggins has promised to take charge of this experiment.

After making these researches, we examined the geological structure of the soil and rocks around and near the well, levelled up to the top of the hill, and measured the distance and ascertained the slope of the strata of sand and gravel, which dip toward the well, and undoubtedly form the soil through which the well was sunk. To the top of the hill, where the gravel bed exists, is 45 feet from the top of the well, and 80 feet from its bottom. The slope of the hill is 6° and toward the well, while the strata of sand and gravel, at the outcrop, appear to have a rather steeper dip in the same direction. The distance from the well to the gravel bed is 450 feet, and its direction is N. 50° west from the well.

On examining the section of the soil exposed at the gravel bed

on the road side, we observed that the lowest stratum exposed is made up of rounded and water-worn stones, consisting chiefly of the blue and gray limestone of the country, but mixed with those of a dark granite or sienite and quartz, which are certainly drift bowlders and from a distance. There is a stratum of sand over the pebbles, but it is quite disturbed, and varies in thickness from two feet to eight inches in different parts of the exposed section. Over this is a layer of fine clayey sand, having more distinctly the appearance of an aqueous deposit, and upon this is the usual soil of the country, consisting of brown loam, somewhat sandy in its character. On traversing the country to the northwest of this gravel bed, we found extensive ledges of naked blue and gray limestone rocks, the surface of which bore strong marks of aqueous abrasion, and in many places deep holes have been made in the rocks, by the action of water, and perhaps of drift bowlders. Loose rounded rocks of granite, sienite, and quartz, strangers to this region, occur scattered over the surface of the ledges, and are a portion of the northern drift deposit.

Your committee reserve their opinion as to the cause of these phenomena until they can gain more light on this very interesting subject, and hope to have occasion to report further progress some time during the summer, when they shall have made more extended researches, and visited other localities, where frozen wells are stated to exist.

For the committee,

CHARLES T. JACKSON.
JOHN H. BLAKE.

Prof. W. B. Rogers described in this connection the so-called natural icehouses in Virginia; in these cases the ice penetrates the large interstices of the rocks during winter, and the natural covering of the soil, a poor conductor of heat, protects from the heat of the sun in summer. He observed that it was important to consider the mean temperature of the place in explaining the phenomena of frozen wells; the mean annual temperature of Brandon is only 45° F.; of the winter 20°, of the spring 40°; giving for the winter and spring a temperature of 30°, or 2° less than the freezing point of water—in fact, at about the depth of 30 or 40 feet, a reversal of the seasons takes place, so slow is the

progression of temperature downward. The access of external air is also important; the temperature of the air in winter at the bottom of this well must be very low; the lateral perforation of this low temperature ought to be traced; the law of progress of temperature from the surface downward in this special locality should be ascertained. So that the question of explanation becomes very complicated.

Dr. Bryant presented a number of valuable specimens of natural history which he had collected in the Bahama Islands during the last spring. He remarked that all the islands seem to be composed of the same limestone, which the sea is gradually undermining and washing away. He found no fossil shells except of such species as now exist on the islands. The soil in many places contains great quantities of oxide of iron; also incrusting the rocks in various places, the presence of which substance he was at a loss to account for. It is generally believed and stated that the gulf weed is seen always floating, and that the place of its growth is not known; he had found it growing all over the Bahamas, attached to rocks like any other sea-weed. He presented many fine specimens of Gorgonia, and of sponges, of the latter of which many varieties were shown growing together. He found no fringing coral reef in the part of the Bahamas visited by him, though he had sailed many hundred miles among them in various directions. He presented a large collection of plants and fungi, and of land and marine shells and crustacea—also a large and valuable collection of fishes, containing many rare and some new genera and species.

Mr. Putnam observed, in regard to the fishes, that they presented a remarkable resemblance to the fauna of the Sandwich Islands.

Prof. Rogers offered an explanation of the occurrence of the ferruginous matter with carbonate of lime, by reference to the ferruginous sand over marl beds, so common in the Southern States; in this there are many fossil specimens in which the petrifying agent is oxide of iron. This would suppose a state of things in the Bahamas, when the iron was there, very different from what is seen now; a very slight proportion of iron, how-

ever, would sift out the carbonate of lime, and the iron remaining behind would in course of time produce a large percentage where it originally existed only as 1 or ½ per cent.

Prof. Rogers exhibited specimens of the supposed coal-bearing rocks of Maine, in which was an impression closely resembling *Cyclopteris Hibernicus*, so common in Great Britain. He was of opinion that these rocks of Perry, Me., belong to the sub-carboniferous series, so extensive in Ireland—they are abundant not only in New Brunswick and Nova Scotia, at the depth of several thousand feet (and containing the famous asphaltic coal); but throughout all the Appalachian chain. They are below the productive coal series, yet in some cases they do contain workable coal seams two, three, or five feet in thickness.

Prof. Rogers also exhibited a geological survey of Newfoundland, made by Mr. Jukes in 1824, interesting in connection with the specimens of *Paradoxides* recently found there. Specimens sent to England had been named *P. noviapertus*, but this must be given up for that of *P. Harlani*, bestowed upon the same fossil, described many years ago by Dr. Harlan of Philadelphia.

Dr. Jackson observed that he had traced the rocks of Perry, Me., to rest directly upon Silurian rocks.

The Treasurer's Report, in regard to discharging the debt of the Society, was read and accepted.

Dr. Marcus B. Leonard, of East Boston, was elected a Resident Member.

DONATIONS TO THE MUSEUM.

April 6, 1859. Specimens of lava, from Mauna Loa, Sandwich Islands, eruption of 1856; by Dr. C. F. Winslow. Three species of *Melania*, and two of *Helix*, from the Sandwich Islands; by James Lewis. *Echinopora*, from Singapore; by Theodore Lyman. *Cottus Groenlandicus*, *C. Virginianus*, *Sebastes Norvegicus*, *Gasterosteus quadracus*, *G. biaculeatus*, *G. occidentalis*, *Perca flavescens*, *Fundulus pisculentus*, and *Hydrargyra flavula*, from Salem, Mass.; by Dr. R. H. Wheatland.

April 20. Berries of *Rhus succedaneum*, from Japan; by Dr. C. T. Jackson. Horned lizard, from Texas; by Dr. L. M. Sargent. Clay stones, from Rensselaerville, N. Y.; by Edward Renouf.

May 4. Sandstone, from Pepperell, Mass.; by T. J. Whittemore. Tertiary infusorial earth, from vicinity of Richmond, Va., and *Scolithus linearis*, from Richmond; by Prof. W. B. Rogers. Chameleon, from Madagascar; by Benj. F. Stevens.

May 18. Thirty-seven species of shells, from Bay of Cumana and Hayti; by Dr. A. A. Gould.

June 1. Casts of *Paradoxides Harlani*, from Braintree, Mass., and from St. Mary's Bay, Newfoundland; by Dr. C. T. Jackson. *Eupagurus Bernhardus*, from Nahant; *Clibanarius vittatus*, from Florida, and *Branchipus*, from Salem; in exchange with Essex Institute. *Cordiceps Carolinensis*, from W. Roxbury, and specimens of the apple and peach borer, from Littleton, Mass.; by Dr. S. Kneeland, Jr.

June 15. An extensive collection of fishes, crustaceans, reptiles, shells, and marine growths, from the Bahama Islands; by Dr. Henry Bryant. *Clibanarius vittatus*, from Charleston, S. C.; *Eupagurus longicarpus* and *E. pollicaris*, from Nahant; *Cenobita Diogenes*, from Hayti; *Palemon vulgaris*, from Salem; and *P.* ——, from Africa; in exchange with Essex Institute. Velvet-spotted spring-beetle, *Elater oculatus*; by C. L. Andrews. Large spider, from Dorchester, Mass.; by George H. Barry.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1859.

Mémoires et Documents relatifs à l'Histoire du Canada. 8vo. Pamph. Montreal, 1859. *From Capt. Latour.*

Phycologia Australica. By Wm. H. Harvey. Nos. 4–8. 8vo. London. *From Dr. B. D. Greene.*

Report of the Geological Survey of the State of Iowa. By James Hall and J. D. Whitney. 2 vols. 8vo. *From the Authors.*

Reply to the Criticisms of J. D. Dana. By J. Marcou. 8vo. Pamph. Zurich, 1859. *From the Author.*

List of known species of Plsidium, with their Synonymes. By Temple Prime. 8vo. Pamph. 1859. *From the Author.*

Leçons Elementaires de Botanique. Par Emm. Le Maout. 8vo. Paris. *From Dr. S. Durkee.*

Catalogue of Canadian Plants. By Prof. J. Barnston, M. D. 8vo. Pamph. Montreal. *From the Author.*

Report of the Superintendent of the Coal Survey, for 1857. 4to. Washington. *From Prof. A. D. Bache.*

Contributions to the Paleontology of New York. By James Hall. 8vo. Pamph. Albany, 1858. *From the Author.*

Patent Office Report. Arts and Manufactures. 3 vols. 8vo. Washington, 1858. *From the Patent Office.*

Iron Manufacturer's Guide. By J. P. Lesley. 8vo. New York, 1859. *From the Author.*

Edinburgh New Philosophical Journal. Vol. IX. No. 1.

Geology of Pennsylvania. By Prof. Henry D. Rogers. 3 vols. 4to. With vol. of maps, &c. Edinburgh, 1858. *From Prof. Henry D. Rogers.*

On the Lower Coal Mines, as developed in British America. By J. W. Dawson, L.L.D., &c. 8vo. Pamph. Montreal, 1858.

Additional Notes on the Post-Pliocene Deposits of St. Lawrence Valley. By J. W. Dawson, L.L.D., &c. 8vo. Pamph. Montreal. *From the Author.*

Proceedings of the Elliott Society of Natural History of Charleston, S. C. Vol. 1. 8vo. 1859.

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 9 and 11. 1859.

Bulletin de la Société de Geographie. 4ème série. Tome XVI. 8vo. Paris, 1858.

Canadian Naturalist and Geologist. Vol. IV. No. 2. April. Montreal, 1859.

Canadian Journal of Industry, Science, and Art. No. 20. March. Toronto, 1859.

Monatsbericht der K. Preuss. Akademie der Wissenschaften zu Berlin. 8vo. 8 Nos. Sept. 1857, to June 1858.

Mathematische Abhandlungen der K. Akademie der Wissenschaften zu Berlin. 4to. Jahr. 1857. Berlin, 1858.

Physikalische Abhandlungen der K. Akademie zu Berlin. Jahr. 1857. 4to. 1858.

Transactions of the Cambridge Philosophical Society. Vol. X. Part VI. Cambridge, (England). 4to. 1858.

Ofversigt af Kongl. Vetenskaps-Akademiens Förhandlingar. 8vo. 1857. Stockholm.

Kongliga Svenska Vetenskaps-Akademien Handlingar. Bd. I. 2. 1856. 4to. 1.

Kongliga Svenska Fregatten Eugenies Resa Omkring Jorden under befäl af C. A. Virgin. 4to. 1. Botanik. 1, 2, 4. Stockholm.

Zeitschrift für die Gesammten Naturwissenschaften. Jahrgang, 1858. Elfter Band. 8vo. Berlin.

Notices of Proceedings of the Royal Institution of Great Britain. Part VIII. 8vo. Pamph. London, 1858.

List of Members, Officers, &c. 8vo. Pamph. London, 1858.

Journal of the Royal Dublin Society. Nos. 9–11. 8vo. 1858.

Journal of the Geological Society of Dublin. Vol. VIII. Part 1. 8vo. 1858.

New York Journal of Medicine. Vol. VI. No. 3. May, 1859.

Archiv für Naturgeschichte. Wiegmann and Erichson. 8vo. No. 2. 1858. Berlin.

Recueil des Actes de l'Académie Impériale. 2me Trimestre. 1858. 8vo. Pamph. Bordeaux.

Natural History Review. Vol. V. No. 4. Oct. 1858. London.

Proceedings of the Royal Geographical Society of London. Vol. II. No. 6. Oct. 1858.

Actes de la Société Linnéenne de Bordeaux. 8vo. 1858. 8me Série. Tome 1.

Jahrbücher des Vereins für Naturkunde. 8vo. Wiesbaden, 1857.

Verhandlungen der Russ. Kais. Mineralogischen Gesellschaft zu St. Petersburg. Jahrgang, 1857–8.

Silliman's American Journal of Science and Art. No. 81, for May, 1859. *Received in Exchange.*

Annals and Magazine of Natural History. Nos. 15, 16, and 17. London. 1859. *From the Courtis Fund.*

Encyclopædia Britannica. Vol. 17.

Life of Fred. Wm. Steuben. By F. Kapp. With introduction by Geo. Bancroft. 8vo. New York. 1859.

Memoir of Theophilus Parsons, Chief Justice of Supreme Judicial Court of Massachusetts. By his Son, Theophilus Parsons. 8vo. 1. 1859. *Deposited by the Republican Institution.*

July 6, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. Stodder read the following paper:—

ON COLLECTING, PREPARING, AND MOUNTING DIATOMACEÆ FOR THE MICROSCOPE.

BY ARTHUR M. EDWARDS, NEW YORK.

Although most of the published treatises on the microscope profess to give thorough directions for mounting objects in such a manner as to preserve them for almost any length of time and exhibit their characteristics, very few of them present any concise descriptions of the best methods of collecting or mounting Diatomaceæ. In general they treat solely of the fossil, or semi-fossil, species, and even such directions as relate to these are meagre and unsatisfactory for the most part, and, where they amount to specific and special directions, are copied from other books, so that any faults that may have been in the original are repeated. To mount Diatomaceæ for the purpose of sale is one thing, and to prepare and mount them so as to exhibit the natural characters for the purpose of study is another. The latter can only be attained after considerable practice; and to do it properly a certain knowledge of their natural history is necessary.

The Diatomaceæ should always be mounted for a special pur-

pose; that of exhibiting characters peculiar to genera and species. Of course we must leave entirely out of the question all such objects as muds, guanos, dredgings, &c., which can very rarely, if ever, be used for the purpose of exhibiting species. Gatherings containing many species in a mixed condition should invariably be rejected, unless they contain something of special importance, such as rare species, or some large and fine specimens of common species. In this paper it is my intention to give such plain and concise directions as will, I hope, materially aid students in mounting these interesting organisms in such a way as to exhibit their characteristics in a proper manner. For many of the hints I am about to give I am indebted to Professor Walker-Arnott of Glasgow, Scotland; the rest are the results of the experience of about six years spent in this pursuit. For the method of cleaning guanos, infusorial earths, muds, &c., the reader is referred to a paper, by the present writer, published in the seventh volume of the London Journal of Microscopical Science.

All gatherings should be made in as clean a state as possible in the first place, as it will be found difficult to clean them afterward. The Diatomaceæ are to be found growing in both fresh and salt water, either attached to submerged aquatic plants of larger growth, or floating freely on the surface. It is a mistake, that most writers on this subject have fallen into, to term any of the Diatomaceæ parasitic, as they do not subsist on nutriment derived from the plant, or other substance, to which they are attached. The attached species might more properly be termed *epiphytaceous*, and the free ones *eleutheraceous;* many species, however, there is little doubt, are at one period of their existence fixed, and at another free. That there are any true free species is unestablished; that is to say, I very strongly suspect that all of our so-called free species are fixed during the earlier period of their growth. Some species are to be looked for on the surface of the muddy bottom, or in the stomachs of certain marine creatures, as the *Salpæ*, the *Noctiluca miliaris*, &c. A peculiar method of procuring these last is used, and will be described.

Diatomaceæ are to be looked for in almost every stationary piece of water, and, in some cases, in transient pools, the result of flooding or rain. Freshwater species will be found attached to, or entangled among, the leaves and stalks of larger submerged

aquatic plants. The common Hornwort, *Ceratophylum demensum*, is often thickly incrusted with *Synedræ*, *Melosiræ*, &c., so that it is of a brownish color. Marine plants are also covered in the same manner; thus, I have had *Bryopis* completely covered with *Melosira Borreri* and *Cocconeis scutellum;* the first species being again the support for *Podosphenia* and *Synedra*. *Ectocarpus* is often so covered with *Synedra*, and the freshwater *Confervæ* have in general so many Diatoms growing attached to them, that I have in this way collected several *ounces* of *Synedra radians*. On rocks and sticks, more especially in running water, are to be found the filamentous and frondose species. In the month of April last, I found in the fountain in Washington Square, New York, in which the water had been kept running all through the winter, a large quantity of *Fragilaria capucina* associated with a few other species, and incrusting the iron tube of the fountain. The *Fragilaria*, from growing in rather violently running water, was extremely tenacious in the adherence of its frustules one to the other. Some freshwater species are to be found floating on the surface, but this is not as often the case as with the brackish. The plants bearing the Diatoms may be agitated in clear water and the species allowed to settle. The water used should be from the same locality as the Diatoms, or, if from any other, be carefully filtered through chemists' filtering paper. This precaution will prevent the introduction of any extraneous species which it would be impossible afterward to remove, and prove extremely puzzling, as I had experienced until I found out this method of obviating it. Writers in general recommend the use of distilled water, but the filtered article answers every purpose, and is procured by a much easier and expeditious process. The general appearance of Diatoms when floating, is of a reddish-fawn colored mass of a seeming porous nature, but when they are in small quantity they appear only as a stain on the water, and when attached to floating confervæ the brown of the Diatoms is masked by the green of the confervæ. A pond or stream may be known as likely to yield Diatoms, from its having growing in it much vegetation of a larger size. In general, quiet ponds, or such as have but slow streams running into and emptying out of them, will be more likely to reward the searcher than briskly running streams, in which the Diatoms are loosened from their

hold and carried down to the valleys, or mouth of the stream. This is the reason why we often find mountain species associated with those growing in valleys, or, in some cases, even with brackish and marine species. Many of these freshwater species will undoubtedly exist for a short time in brackish or marine localities, often becoming much changed in their characters. It is extremely likely that this fact has sometimes led to mistakes by inexperienced observers, and the consequence has been the erection of these varieties into species. Again, brackish or marine species may be carried by tidal or other influences into fresh localities, and a total change of characters result. At the present time I am engaged in experimenting on this subject, and shall, I hope, be able before long to lay the results before microscopists. Professor Walker-Arnott has stated some curious facts, relating to this subject, in the April number of the London Microscopical Journal for this year (1859). It would, however, be out of place for me to enter any farther into the discussion of this subject in the present paper, but I recommend the student to bear these facts in mind when examining doubtful forms.

Brackish species are to be looked for in swamps and marshes along the coast. Whether there exist such things as true brackish species is, to me, a matter of doubt; such as are called so being, in my opinion, either marine forms which have been carried by the tide into their new locality, (which is the most likely,) or freshwater species brought down by streams from higher ground. Thus, I have found in a salt marsh in New Jersey a form which looks to me like a variety of *Pinnularia viridis*, a true freshwater species. In the same marsh, even in the least salt portions, I have found many fine species, as *Amphiprora vitrea*, *Pinnularia peregrina*, *Navicula elegans*, and many others, in large quantities, forming masses of considerable extent, and floating on the surface, buoyed up by the numerous bubbles of oxygen set free from the water by the action of the sun on the Diatoms. All of these are generally considered as marine species. Submerged species are to be found in brackish water in the same positions as in fresh.

In the ocean, very few species are to be found floating on the surface, except in rock pools, but are found in the stomachs of certain microphagists. The filamentous forms, on the contrary,

are to be found in immense quantities along with the attached forms, as *Cocconeis*, &c., and this most commonly on rocky coasts, where often the algæ, rocks and coralline zoöphytes are covered with them. Dr. Wallich found *Coscinodisci*, *Rhizosoleniæ*, and *Chætoceras*, floating on the surface of the ocean in the tropics, but I have never heard of such an occurrence in our seas. The species attached to algæ may be preserved, until they are wanted to be permanently mounted, in alcohol; they are thus kept in their natural state. Species may be removed from the algæ by immersion and boiling in a weak mixture of nitric acid and water, (containing four to five per cent. of acid,) which corrodes the cuticle of the alga without breaking up the chains of Diatoms. The algæ may then be taken out with a glass rod, or strained off through a piece of wire gauze or fine muslin; if the latter be used, the filamentous Diatoms will often be retained along with the algæ, and such attached species as *Cocconeis* pass through. All marine, or brackish, species should be washed in filtered freshwater, so as to remove all soluble salts, which would otherwise obscure the specimens, previous to immersion in alcohol, or mounting. I should mention here, that often freshwater, unless it be distilled, will contain certain salts, as lime, which will, on evaporation, crystallize on the glass and mar the beauty of the specimen, therefore it is advisable to use distilled water, or alcohol, for the last washing. As a rule, it is always preferable to make the collection as clean as possible in the first place, as it will be found difficult in many cases to render the Diatoms perfectly free from sand and mud afterward. Where they float on the surface of the water, or are attached to larger algæ, this is not difficult, but where they are on the mud at the bottom it is not so easy. It can, however, be done by carefully removing them with a camel's-hair pencil, or, if we do not happen to have one with us, the mud can be removed in a wide-mouthed bottle (selecting as much of the surface as possible) and, at home, transferred to a saucer and placed in the sunlight. The living specimens will then congregate toward the lightest side, and may be taken up with a camel's-hair pencil and transferred to a test tube or specimen vial. The latter are the vials used to hold homœopathic medicines, and those of about a drachm capacity will be found the most convenient, though, for scarce gatherings, much smaller ones

may be used with advantage. Dr. Donkin has given * a process by means of which Diatoms left by the receding tide on the seashore may be separated from the heavier particles, and which seems to have yielded him a rich harvest. The attached and filamentous species should always be kept separate from the free ones, in alcohol, as they have to be treated in a different manner. We must also suit the amount of boiling, and the strength of the acid, to the species; some being destroyed by the smallest quantity, and others being ruined by strong acid. Many species, however, (as most of the genus *Pinnularia*) require often a minute and a half to two minutes' boiling in strong acid to separate the valves from the connecting membrane.

Some of the finer marine species are to be looked for in the stomachs of Salpæ, Noctiluca, and other minute marine creatures, while the stomachs of most of the mollusks, and those of many crustaceans and fish, will repay examination. The Salpæ and Noctiluca are to be procured by skimming the surface of the ocean (more especially in quiet bays and harbors) with a fine muslin net, which may be floated by means of cork or wood, and dragged at the stern of a boat rowed slowly along. When the Noctilucæ are in any quantity, the surface of the ocean will exhibit a livid light playing upon its surface, especially where it is broken, as on the margin and where the prow of the boat parts it, or the oars disturb it. They are most plentiful in summer, but Diatoms are to be found in them all the year round. Col. Baddely found in them, during the winter, such genera as *Triceratium* and *Actinocyclus*, and during the summer months the filamentous forms, as *Rhizosolenia*; the same facts, or similar ones, will undoubtedly be observed on our own coast when more attention is paid to this branch of science. I would recommend all who have opportunities of doing so to collect the Noctiluca of any part of our coast and preserve them in alcohol for the Diatoms they contain. The Ascidiæ and Holothuriæ also yield rich harvests of Diatoms, and when they come from a distance, as from the Pacific Ocean, where they are plentiful, are extremely interesting. The contents of the stomachs of the Noctilucæ may be simply washed in distilled water and preserved in alcohol; those of Salpæ and Ascidiæ should be cleaned with nitric acid, but the

* Mic. Soc. Trans. Vol. VI. p. 12.

contents of the stomachs of Holothuriæ, mollusks, and fish, will have to undergo a peculiar process similar to that recommended for guano, though, in some cases, boiling in nitric acid alone will be found sufficient. I would here mention, that the process used in England for cleaning guano, of boiling in chlorohydric acid, carbonate of soda, and nitric acid successively, I have not found to succeed, and that described by me in the London Microscopical Journal is the only one that I have found to approach perfection.

For the purpose of collecting Diatoms, it will be found convenient to be supplied with appropriate apparatus. A tin sandwich-box is an excellent reservoir for the bottles. These may be of about the capacity of two ounces, which is the size I have found the most convenient, and the box should hold ten or a dozen of them. Sometimes it will be found convenient to be provided with a few small vials, of about a drachm capacity, for the purpose of holding portions of scarce gatherings. A walking-stick with a ferule attached, made to receive some contrivance for holding bottles, will often be found necessary. Such a one is described by the present writer in Vol. V. of the London Microscopical Journal. I have used a similar one for nearly five years, and it is in as good order as when first made. Smith * and Donkin † have given some hints on collecting Diatomaceæ which the reader will find useful. Certain species affect certain seasons, so that in the same locality, at different seasons, totally different species will be found. A complete knowledge of the seasons in which the different species flourish is much wanted, and the student will do well to pay attention to this branch of the science.

When the gatherings are taken home, they may be turned out into saucers and placed in the sun; in this way the living Diatoms will be separated from the dead ones, the former floating on the surface and approaching the light. Many of the gatherings, no doubt, will be found useless, either from being mixed with mud and sand, or from the mixed quality of the species contained, and had better at once be rejected, as, unless they be wanted to illustrate locality, (an almost endless task,) it will be found extremely difficult to clean them in a proper way, so as to show satisfactorily the species they contain. Some collectors examine the gatherings on the ground by means of some such

* Synopsis. † Mic. Soc. Trans. Vol. VI. p. 12.

contrivance as the Gairdner microscope, described by Dr. Carpenter, or improved by Mr. J. N. Tomkins.* Dr. Arnott informs me that he uses two Coddington lenses, one of 66 diameters, and one of 180, generally using the former only. In this way we may at once tell what is worth retaining, and what should be rejected. Gatherings are, however, always examined with the compound microscope soon after we get them home; the movements of the Diatoms in their living state may then be observed, and the presence and position of the endochrome noted. To study the reproduction of these plants they must also be observed in the recent living state, as no method of mounting known will preserve, in their natural condition, the characteristics of this interesting and important part of their natural history.

If we wish to mount the Diatoms simply to show that they are Diatoms, and to surprise the uninitiated, nothing is easier; we have but to boil them for some time in nitric acid, wash them with water, and place a small quantity of the sediment on a glass slide, and dry it over a spirit lamp. When it is dry, and still hot, we drop upon it a small quantity of Canada balsam, and place over it the previously prepared thin glass cover and press it down. When the balsam is sufficiently hard, the superfluous portion which has exuded around the cover is removed with a penknife, and the slide is cleaned with alcohol; this latter being far superior to turpentine, which the European (and more especially English) microscopists use, on account of the high price of alcohol. The above process is extremely easy to manipulate, but it will never satisfy a student of the Diatoms; for, though it is sufficient for fossil and sub-peat deposits, it would never do for the purpose of illustrating genera and species, for which Diatoms should be prepared and mounted. We therefore proceed to show how they may be mounted so as to satisfy a student, and render permanent their characteristics, so that they may, at any future time, be exhibited and studied.

We shall require, in the first place, a quantity of glass slides, of the dimensions of one inch wide by three inches in length. These should be of as white glass as possible, and ground on the edges so as to give them a neat and finished appearance. Only such as are free from scratches, or other blemishes, in the central

* Mic. Jour. Vol. VII. p. 57.

square inch, should be chosen; though such as have bubbles or scratches near the ends will not look ornamental in a cabinet, we should remember that microscopic objects are not generally mounted to look well in a cabinet, but to be useful out of it, so that if the central and useful portion of the slide be perfect it need not be rejected. Thin glass, such as is made on purpose for microscopic use, will be next required, and it will be found more convenient to buy it ready cut into squares and circles than to attempt to cut it ourselves. If, however, we do have to cut it ourselves, we may follow the direction given in the books, which I will not repeat here, only adding one fact that I have not seen generally noted, which is to place the thin glass on a piece of *wet* thick glass, or marble, the water preventing its breaking, as it will be apt to do if this precaution be not taken. The thin glass may be of different thicknesses, but for the more delicate species it must be as thin as possible. It should be perfectly clean, which may be insured by removing the grease with potassa lye, and the resinous substances with turpentine, or alcohol, or both. The thinner kinds of glass are rather difficult to clean, but with a little extra caution this may be accomplished, the last polish being given to it by a piece of old and well worn cambric. It should then be separated into thicknesses and kept in starch powder, which prevents its being scratched, but all the starch must be carefully removed with a dry piece of cambric before the glass be used, otherwise granules of starch will be introduced which will prove puzzling when we come to examine the slide under the microscope.

We shall also require a pair of forceps for holding the slides over the spirit lamp, and such as are sold under the name of American clothes-pegs are extremely useful, and answer all the purposes of more complicated and expensive arrangements. A small pair of brass forceps which close with a spring will be needed for holding the thin glass, and an ordinary pair which spring open, and may be closed by means of the finger and thumb, will be wanted for removing the thin glass from the box in which it is kept. A spirit lamp holding about four fluid ounces and a few test tubes for boiling the deposits, together with a small quantity of nitric acid, alcohol, and turpentine, will be found necessary. For the purpose of making cells will be needed

a Shadbolt's turn-table and some cements. Brunswick black and asphaltum, or gold size, are recommended by the European writers, and I have sometimes used a preparation of fine red sealing-wax dissolved in alcohol, or a mixture of asphaltum, pitch, and gutta percha, made by dissolving asphaltum in turpentine until it will take up no more; this is strained through fine muslin, and pitch added to the liquid, so as to make, when it is dissolved, a composition about as thick as Canada balsam. To this a few pieces of gutta percha are added, and it is allowed to stand in a covered vessel until it becomes thick enough for use, which may be known by its dropping only with some difficulty from the camel's-hair pencil used to place it on the slide. For mounting Diatoms in their recent state, so as to exhibit the stipes in the stipitate species and the endochrome in all of them, a mixture of equal parts of proof spirit and distilled water will be found useful. For some species I have found an excellent medium to be Mr. Farrant's compound of glycerine and gum Arabic,* it preserves the endochrome of the Diatoms and the plant on which they are found growing intact and of its natural appearance. For some species, however, it will not do, as it renders them so transparent that they are with difficulty visible.

I will now proceed to specify the different methods of mounting Diatoms separately; lettering them so that they may be referred to.

A. We wash the gathering in fresh water, which has been either distilled, or, at least, filtered, and separate the heavier from the lighter species. We shake the gathering violently in a large quantity of water, and almost immediately pour it off; this removes all sand and gravel. The Diatoms are allowed to settle, and the water is poured off after about an hour's standing. Enough fresh water is now poured over them to make a height of two inches in the glass, and it is allowed to stand for twenty, or at most thirty minutes. The water being carefully removed, it carries with it the mud and portions of broken valves. Even the smaller species will subside through two inches of water in thirty minutes, but, as Dr. Arnott remarks in a letter to the present writer, "such as *Odontidium parasiticum* and a few other minute things may require an hour, as they lurk among the mud,

* Lond. Mic. Jour. Vol. VI. p. 118.

being as light." We can now arrange according to densities, and in this way often separate most of the species contained in the gathering. Several processes of elutriation are mentioned in the London Microscopical Journal, but I have found that using always two inches of water, and separating the thirty minutes into five or six periods, answer all purposes. In this we shall get all the larger *Triceratia*, *Pinnulariæ*, &c., in the heavier densities, and the small *Achnanthidia* and *Naviculæ* in the lighter. Often one application will not separate the densities sufficiently, when it may be tried three or four times. If the gathering be not divided into densities before "acidizing," it will have to be done after; that is to say, if it be not a comparatively clean one, consisting of a majority of one species. The different densities are now each placed, in small quantities, in a test tube, and about three quarters of an inch of nitric acid added, and boiled. This will remove all but silica, and separate the valves and connecting membranes; but if we wish the valves to remain united, we must use weaker acid, as I have mentioned before. When the sediment has been well washed, so as to remove all the acid, we may proceed to mount it, which is done as follows. A small portion is taken up with a dipping tube, or a glass rod, (the first being the best,) and spread with a little water on the centre of a clean slide. Only a small quantity should be used, otherwise the Diatoms will be crowded and overlap each other. It is always better to have too few than too many specimens on a slide. We now heat the slide cautiously over the flame of the spirit lamp until it is perfectly dry, and while it is warm a small quantity of Canada balsam is dropped on it, and the heat is continued (but not so violently as to boil the balsam) until we consider it ready to receive the cover, and this point can only be ascertained after some experience. The cover, previously cleaned, is now placed on the balsam, one side being placed down first, so that a wave of semi-fluid balsam is driven before it; we thus prevent the introduction of bubbles, which would be extremely difficult to get rid of afterward. Balsam mounting is always to be preferred when it can be done so as to show the species, and when we have gone through the above steps we have finished the mounting part. The slide only requires to be put aside until the balsam is perfectly hard, which will sometimes not be for a week. The ex-

traneous balsam around the cover is now removed with a penknife, or a brad-awl, and the slide cleaned with alcohol, and wiped dry.

B. Filamentous and stipitate species must be mounted by the above process to show the valves, and by another special one to show the genus. They are placed in alcohol, which removes the endochrome without breaking up the chains, and then a small portion is dried on a cover, and when it is cool a drop of turpentine added. This permeates the frustules, and prevents the entrance of air when the balsam is added. A small quantity of balsam, in a fluid state, is now dropped on it and heated very cautiously over the spirit lamp, whose wick has been pushed down until only a small blue cone of flame is visible. A drop of balsam is placed in the centre of a clean and warm slide, and, after that on the cover has been sufficiently thickened, they are united, pressed together, and allowed to cool, when they may be cleaned as above. This process preserves the filaments, and brings the specimen nearer to the object-glass than if it were dried on the slide.

C. Sometimes the treatment with alcohol does not remove all the endochrome, when it will have to be burned out over the lamp as follows: The Diatoms are spread on the cover and dried. The cover is still kept over the small blue flame, and we see the specimen turn of a light brown, then darker, until it is black, and finally white, when it is brought down smartly once or twice to the flame. This must not be done too suddenly, nor must the glass be removed too soon, or it will crack from the sudden change of temperature, and if the thin glass be kept too long over or against the flame, it will bend and be useless.

D. Diatoms which have been dried or burnt on the cover may be mounted dry by means of cells. These are best made of Brunswick black, or some other varnish, and they should be made in quantity and kept on hand. The method of making them is given in most of the handbooks. When the Diatoms have been dried on the cover, and the glass is still somewhat warm, it is placed upon the ring of varnish, with the Diatoms toward the slide, and pressed down. If it does not at once adhere, it is not advisable to heat it from below, but a warm knife may be laid on it, or a warm wire passed around on the thin

glass until it adheres completely, and this it must do all around before we attempt to add the outer coat of varnish. I have often dispensed entirely with this extra coat, though, if the varnish be at all brittle, it will be necessary.

E. The process of mounting in fluid is very similar to the last described, except that the Diatoms are placed in the cell, and the fluid dropped on them until it rises slightly above the edge of the cell, to which it will adhere by capillary attraction. The cover has then a line of fluid drawn across it with a glass rod, and one side, on which the line terminates, placed down first. It is then allowed to fall slowly, driving a wave of fluid before it, as in the case of balsam mounting. The line of fluid attracts the mass of it, and no bubbles are allowed to enter. If any air should get into the cell, either from evaporation or carelessness, the cover will have to be removed, and the operation commenced over again. After the cover is placed on the ring, the exuded fluid is wiped off, and a ring of varnish placed over the edge of the glass. This part of the operation is explained in the handbooks, so I will not repeat it here. Mr. Farrant's medium, which I have mentioned above, does not require any cell, and in many cases no exterior ring of varnish, as it becomes almost solid, and retains the cover in its place. Many species will require all of these modes of mounting to show all of their characters, but some will require to be mounted only in balsam and in the dry way. Some species are ruined by balsam, while others are improved, therefore different modes should be tried, and that which seems to give the best results adopted.

Diatoms may be kept in quantity in alcohol, dried on mica (which is the best), or dried on mica after boiling in acid. These last are sometimes difficult to remove from the mica. Carbonate of soda and water, or even acid, will often have to be used. Diatoms kept on mica have the advantage of being always ready to be mounted by any of the above methods, and they may also be sent through the post, as they are not bulky, nor do they weigh anything considerable.

When the gatherings are small, they may be kept, after they are cleaned, in small bottles similar to those mentioned above, but when in any quantity, they will require to be kept in two or four ounce vials; and, so that we may remove any quantity for mount-

ing, we use what are called "dip tubes," which are glass tubes drawn out at one end so as to form a small orifice. When the thumb is placed on the larger end, and the smaller brought down under the water until it is almost in contact with the deposit, and the thumb removed, the water will rush in, carrying with it some of the Diatoms. The thumb is then replaced and the tube withdrawn. In this way we can extract any quantity of the deposit we wish. A tube should be used for only one deposit, otherwise we shall be apt to have species from one gathering mixed with another totally different one. I generally have the cork to each of my specimen bottles with a hole in it, and a glass "dip tube" passed through it. Thus each bottle is provided with a tube, and if it pass tight enough through the cork, little or no evaporation of the contained liquid will result.

When removing water that has been used for washing a deposit, if we pour it off, and even if we use the guide rod, we shall be almost certain to disturb the deposit, and lose some of the lighter species, which will be decanted with the liquid. To obviate this difficulty, I tip the glass so that the deposit runs down on one side, and then I remove the supernatant water with a large pipette, using it very carefully as the water becomes lower. With a little practice nearly all the water may be removed, and the Diatoms left undisturbed.

Dr. Henry Bryant read the following paper:—

A LIST OF BIRDS SEEN AT THE BAHAMAS, FROM JAN. 20th TO MAY 14th, 1859, WITH DESCRIPTIONS OF NEW OR LITTLE KNOWN SPECIES: BY HENRY BRYANT, M. D.

The Bahama Islands are scattered over a space comprised between 20° 55′ and 27° 15′ North latitude, and 71° and 78° 18′ West longitude. They are of every shape and size, from Andros which contains more than a thousand square miles to the merest point of rock, and are numbered by hundreds if not by thousands. Of course in the short space of time occupied by my visit a thorough examination was impossible. The following observations were made principally at New Providence, in the neighborhood of Nassau, the seat of government; I also made excur-

sions to the Berry Islands lying on the northwest side of the N. E. Providence channel, to the Biminis, the most westerly of the Bahamas, to the east side of Andros and neighboring keys, and to the Exuma and Ragged Island chain of keys, extending as far as 21° 17′ North and 75° 27′ West.

All the islands visited by me presented the same geological formation, a cellular limestone varying in its texture from a rock of extreme hardness to a soft and friable sandstone, and composed of materials thrown up by the action of the waves and winds, of every shape and size, from madrepores of six feet in diameter to the finest sand. In the larger keys the rocky surface is covered with a thin layer of vegetable soil capable of supporting in some places a thrifty vegetation. The majority of the smaller keys are entirely without soil, though when not exposed to the action of the waves they are covered with a thick growth of shrubs, which, in many cases, belong principally to the Cactus family, and are so thorny and tangled that they are almost impenetrable. I saw nowhere the luxuriant vegetation and profuse animal life that is naturally associated with the West Indies. Of native mammals I procured but a single specimen, a species of bat. I was told that at Andros there was a wild rabbit, but could not procure a specimen. The number of sea birds in certain localities is prodigious, but at Nassau I saw but one gull and one pelican. The species of land birds that breed upon the islands are few, though the individuals of some of them are quite numerous. In the class of reptiles, I found six species of lizards, four of serpents, no land or freshwater turtles, and four batrachians. The number and variety of fish are very great. Crustacea and radiata abound. Land mollusks are very numerous, but only fourteen species were seen. Insects, with the exception of lepidoptera and a few species of diptera, were by no means common.

Before visiting the Bahamas, I had supposed that those birds of the United States, which in their annual migration follow the Atlantic coast, crossed over to the Gulf of Mexico on arriving at the Peninsula of Florida, and then followed that shore to Mexico, Central America, &c. This opinion was formed from the fact that while all of these birds are extremely abundant in Southern Georgia, they are rarely seen in the neighborhood of Enterprise and Indian River. From the number of these birds seen at the

Bahamas, I am satisfied that with better opportunities nearly if not quite all of them would be found there, and that, instead of crossing to the Gulf of Mexico as I formerly supposed, by far the greater number on arriving at the River St. John or its neighborhood fly across in a direct line to Central America, stopping on their way to procure food and to rest at any of the islands which lie in their way.

Cathartes aura. Turkey buzzards were very abundant at Andros, and I was told by the fishermen and wreckers that they were equally so at Abaco and Grand Bahama. I saw none on any of the smaller islands. I was for a long while unable to explain satisfactorily to myself the cause of their absence from Nassau, as in the United States they are generally very abundant in the neighborhood of the large southern cities, as Charleston and Savannah for instance. This fact, I now think, is owing to their inability to procure food at New Providence. All the animals slaughtered there are literally devoured by the blacks; not a morsel, even of the entrails, is thrown away as offal, so that the slaughter-houses, which at Savannah are their principal feeding places, do not at Nassau offer them a mouthful of food. The number of domestic animals also running at large on the island is so small, that the carcasses of those dying by disease or accident would only afford them an occasional supply; and the native fauna is so meagre that it is unnecessary to take it into consideration.

I passed several days at Grassy Creek near the southern extremity of Andros Island. This is one of the places where the Black-mouthed Helmet (*Cassis Madagascariensis*), of which cameos are made, is procured. The shells after being brought on shore are placed on scaffolds with the mouth downward, in order that after the death of the animal it may fall out by its own weight. These scaffolds are constantly attended by the buzzards, and they can frequently be seen tugging at the protruding animal much to the displeasure of the fishermen, as the birds frequently knock down the shells and sometimes drag them into the bushes out of sight. The name given to this bird by the inhabitants is John Crow, the same as in Jamaica according to Gosse. I examined several specimens but could detect no difference between them and birds obtained in the United States. This is not to be won-

dered at, as the Gulf Stream is so narrow that I think when soaring at the greatest height to which they attain they must be able to see the main land, and if so, doubtlessly pass to and fro. No specimen of the *C. jota* was seen.

Falco anatum. One dead bird seen at Norman's Pond Key. This was an adult male in fine plumage.

Tinnunculus sparverius. Two specimens seen at Nassau, and one at Great Stirrup Key.

Accipiter fuscus. This appeared to be the most common hawk. A number were seen at different places. I was told by many of the inhabitants that a large red hawk was not uncommon in the South Keys, but I saw no other species than those mentioned above and the fish hawk.

Pandion Carolinensis. Fish hawks were found throughout the Bahamas, but nowhere so abundantly as in parts of the United States. The nests which I saw were placed in entirely different situations from those chosen by this bird with us; resembling more nearly in this respect the European species. They were all built on the ground; two that I examined at Water Key, Ragged Islands, were placed on the edge of a cliff at an elevation of about forty feet from the water, very bulky, at least five feet in height and six in diameter, composed entirely of materials taken from the neighboring beaches, principally the horny skeletons of Gorgonias, sponges, bits of drift wood, and sea-weeds. They had been recently repaired and the cavities lined with fresh gulf weed. On the 20th of April, the date of my last visit to them, they contained neither eggs nor young. The eggs in the ovary of a female, shot at this time, were of the size of small peas. The plumage of this specimen differed from any I ever saw in the United States; the whole upper part of the head, nape, and hind neck was white without any admixture of brown; no difference was observed in the comparative measurements. I intended to have preserved it, but unfortunately before I was ready to skin it the cook plucked it for his private table.

Crotophaga lævirostris? A species of Crotophaga was quite abundant in the environs of Nassau. The description of the habits of the *C. ani* by Gosse, is applicable in every particular to the present bird. I procured a number of specimens; in all of hem the bills were quite smooth. The present bird is certainly

not the *C. ani*, and as it may be an undescribed species I append a description of it:—Sexes similar,—general appearance like the other species of the genus. Plumage above, wings and tail dark black with purplish reflection, and in some lights greenish. The tail very obscurely banded, as if watered. Below, dull brownish black; the borders of the feathers of all the upper parts, wing coverts, throat, and upper part of head iridescent. Bill blackish horn color, the edge and tip of culmen light horn color. Tarsi and feet black. Length,* .315; wing from flexure, .143; tail, .184; tarsus, .032; middle toe, .034, its claw, .012; hind toe, .013, its claw, .0105; bill along ridge, .034; gape, .028; height of bill, .020; breadth of bill, .008; nostrils, diagonal, .004 in length by .002 in breadth; the superior edge nearly straight, and the inferior concave; situated .01 from the culmen and .004 from the lower edge of mandible; 4th quill longest; 3d equal to the 5th; 2d, .012 shorter than 4th; 1st, .035 shorter than 4th, and shorter than any other of the primaries.

Saurothera vetula. Quite abundant, called Rain-Crow. Its food during the winter consisted principally of a species of Phasma, found in great abundance in the leaves of the air-plants. This bird is one of the tamest, considering its size, that I am acquainted with. I have frequently watched them searching for insects within two or three feet of my head.

Picus villosus. Two specimens seen at Nassau in the month of February.

Picus varius. Two specimens seen during February, and a number during the spring months. They seemed to prefer the cocoa-nut trees. I did not see them on any other tree. The first pair seen visited the same clump of cocoa-nut trees every day for a fortnight.

Trochilus Bahamensis. This species of humming-bird, which I believe to be undescribed, is the only one found at Nassau and neighboring islands. It is quite abundant there and a constant resident. All the specimens I procured, seven in number, were killed in February and the early part of March; at that time its

* All the measurements given are in parts of a metre, and the height and breadth of bill, when not otherwise mentioned, are always taken opposite the centre of the nostrils.

food consisted almost entirely of a small green aphis, found abundantly on the West Indian vervain, (*V. stachytarpheta,*) a small blue flower that grows in all the dry pastures. Gosse calls the least humming-bird of Jamaica the Vervain Humming-Bird, from its hovering round this plant, but the name would apply equally as well to the present species. I saw nothing in its habits differing from those of the common ruby-throated species, with the exception that it was more quarrelsome in its disposition, chasing the "fighter," as the *Tyrannus caudifasciatus* is called, whenever it came near him, and that its note is louder and shriller than that of our species and much more frequently uttered. Incubation commences by the 1st of March. I saw three nests of this bird; one, found on the 3d of March, contained two eggs partly hatched; a second, April 10th, one egg, and another, in May, two eggs. The nests were all composed of the same materials, principally the cotton from the silk cotton tree, with a few downy masses that looked as if derived from some species of asclepias; this was felted and matted together, and the outside stuck over with bits of lichen and little dry stalks, or fibres of vegetable matter. One now before me measures .030 in diameter, and .033 in height externally, and the inside .018 in depth and .025 in diameter. The eggs, like those of all others of the family, are two in number, snow-white when blown and slightly rosy before, and measure .012 in length by .008 in breadth.

Description. Adult male — above, green with metallic reflections, slightly golden on the back, and with the tips of some of the feathers in some specimens bluish. The head darker and more sombre. Wings brownish purple, with dull greenish reflections in some lights. Tail dark purple, almost black, also with greenish reflections; the outer feather on each side with an almost obsolete terminal spot of rufous, the next with the whole of the inner web bright cinnamon, the next with the whole of the inner and the basal half of the outer web of the same color, this color then running nearly to the tip in a diagonal manner, leaving the part next the shaft purple. The basal half of all the shafts, except the two outer, cinnamon. Throat magnificent purple violet, immediately below this a broad gorget of white; abdomen green mixed with rufous; thighs white; crissum pale rufous white; bill and tarsi black; length, .084; to end of claws, .060; to end of wings, .086;

extent, .123; wing from flexure, .045; tail beyond wings, .005; tail, .028; difference in length of tail feathers, .005; tarsus, .0035; middle toe, .0033, its nail, .003; bill along ridge, .016; gape, .019; height of bill at commencement of feathers, .0013; breadth, .0023. Adult female.—Upper parts less lustrous than in the male, the feathers margined more or less with rufous gray; wings as in male; tail with the middle feather brilliant green, the rest cinnamon with a purplish black band running from the outer feather obliquely downward and inward to the tips of the fourth on each side, forming a broadly shaped mark; between the black band and the cinnamon there is a spot of bright green, most conspicuous in the feather next the central ones and growing gradually indistinct toward the outer ones; throat pale rufous white, the centre of the feathers darkest, and on the sides and posteriorly a little green; abdomen entirely rufous; legs and crissum, pale rufous. The dimensions do not differ from those of the male. Young male in winter.—Upper parts intermediate in brightness between the male and female; throat white, with a few feathers beginning to show the violet; tail as in male.

I have not been able to find descriptions of all the modern genera of this family, but I think it would form a new genus. All the males procured by me, four in number, had but eight tail feathers, while all the females, three in number, had ten. It can hardly be supposed that in four specimens, the same two feathers, and but two, should have been lost from every specimen. In form, the tail feathers are rather narrow, and the inner webs of the two outer slightly falciform or emarginated. The two outer feathers are slightly shorter than the next which are the longest; the next two again rather shorter, and the central ones considerably (.005) shorter. The feathers composing the tail in the female are broader than those of the male; the third from the outside is the longest; the 1st, 2d, and central one as in the male; and the 4th slightly shorter than the 3d.

Chordeiles popetue. Very abundant during the summer months, but migrate farther south in autumn. They began to arrive about the first of May, and were numerous by the 10th.

Ceryle alcyon. Abundant during the winter. I saw none after the 1st of April.

Tyrannus caudifasciatus. Called "fighter" by the inhabitants,

from its pugnacious disposition. It is a constant resident and did not seem more abundant in spring than in winter. In its habits and appearance when flying, or perched on some twig, it resembles very much the *T. dominicensis*, for which I mistook it until I had procured a specimen. Both these birds are much more powerful and active than the *T. intrepidus*, and in the present minute subdivision of genera, should be separated from the genus *Tyrannus*. Its flight is both powerful and rapid, and it frequently swoops from its perch like a hawk on some object on the ground. I took from the stomach of one an *Anolis* six inches in length.

Empidonax Bahamensis. This bird I believe to be new, at least I have been unable to identify it by any description, and it is not contained in any of the collections that I have had access to. It comes nearer, perhaps, to *E. Carribæa* than to any other species I have seen. It is, however, possible that it may have been described; the descriptions of this genus are generally so meagre, while the mutual resemblance of many of them is so great, that it is almost impossible to identify the species positively. I saw only three specimens, all in the month of March. There was nothing peculiar in its habits, which resembled those of others of the genus that I had seen in the United States.

Description. Adult male—Plumage above, dark cinereous brownish olive, the olive tint most marked on the rump, and the head darkest, with each feather showing a darker stripe in the centre; lores ashy white; an incomplete white circle round the eye, broadest behind and deficient above; wings brownish, with the edges of the coverts hoary, forming two transverse bands, the posterior the most marked; edges and tips of the secondaries and tertiaries whitish, most conspicuously so toward the body. Tail brown, with the edges of the feathers slightly olivaceous, and of the outer feather toward the base hoary; throat and abdomen pale yellowish white; sides of the head and flanks cinereous, gradually shaded into the lighter color of the throat and abdomen; breast pale yellowish white washed with cinereous, except perhaps in the centre. Tarsi black; bill with the upper mandible, black; lower, light horn color, with the tip darker; length, .145; to end of claws, .129; to end of wings, .190; extent, .253; wing from flexure, .085; tail beyond wings, .035; tail, .060; tarsus, .014; middle toe, .009, its claw, .0053; hind toe, .006, its claw, .0065;

outer toe, .006, its claw, .0037; inner toe, .005, its claw, .004; bill along ridge, .014; gape, .02; depth of bill, .0035; breadth, .007; length of nostril, .0015; breadth, .0012; 3d quill longest; 4th very little shorter; 2d, .0015 shorter; 5th, .004 shorter, and 1st, .01 shorter than the 3d. The first is nearly equal to the 6th.

Mniotilta varia. Common from April 20th, to May 10th.

Trichas Marylandica. While lying at anchor, on the 20th of April, in the harbor of Grassy Creek, a flock of these birds commenced flying by the vessel, and continued without intermission for two hours; they did not fly in a compact body, but were constantly passing during this time, more or less being in sight the whole period. Many of them alighted on the vessel; all of them that I saw were males. On the 10th of May, they were still abundant in the neighborhood of Nassau.

Sylvicola coronata. A few individuals of this species were to be seen in the neighborhood of Nassau during the months of January and February; by the middle of March they had entirely disappeared. I saw none on any of the smaller islands.

Sylvicola Blackburniæ. One pair seen on April 30th.

Sylvicola striata. Very abundant from the 1st to the 10th of May. In its habits this bird approximates very nearly to the *M. varia*, climbing round the trunks of trees in search of insects, apparently with the same facility as the latter bird.

Sylvicola maculosa. As abundant as in the United States. A few were seen as early as the 15th of March.

Sylvicola icterocephala. Only a few seen in the early part of May.

Sylvicola Canadensis. The males of this pretty and conspicuous species were very abundant near Nassau, from the 20th of April to the 13th of May. I think that in this short period I saw more than I had ever seen before.

Sylvicola maritima. One female shot May 6th.

Sylvicola discolor. More abundant than I have ever met with it in the United States. In January all the males were in winter plumage, and they had not changed entirely to the summer plumage before the 1st of April. I have no doubt that this bird is a constant resident of the Bahamas, and breeds there; it had paired by the middle of April, and after that date I saw none that were not mated.

Sylvicola palmarum. During the winter and early spring this

bird was extremely abundant, but confined almost entirely to the neighborhood of the sea-shore. Its habits are decidedly terrestrial, and it approaches in this respect very nearly to the titlarks. They were constantly running along the edge of the road, or else hopping among the low shrubs in the pastures. I did not see a single individual seeking for food amidst the large trees. My room at Nassau was opposite the market, where these birds could be constantly seen running up and down the pavement in search of the small flies so numerous there. These they caught either on the ground or else by hopping up a few inches, scarcely opening the wings, and alighting directly. Why this bird has been so fortunate as to escape being made a new genus of, I do not know.

Setophaga ruticilla. Very common from the 18th of April to the 13th of May. First seen at Andros Island.

Tanagra zena. Abundant at New Providence. Resident and breeds there. Its food consists almost entirely of small berries; the stomachs of nine individuals examined at different times from Jan. 20th to March 13th, contained no other food. Incubation had not commenced by May 13th, at least not generally.

Hirundo cyaneoviridis. This swallow, which I have been unable to find described, is one of the most beautiful species inhabiting North America. In the style of its coloring it resembles more nearly *H. thalassina* than any other species. I have no doubt that it has been confounded by European naturalists with the *H. bicolor*, though its resemblance to this species is very slight. I saw them during the whole of my stay at Nassau, but only on the first mile of the road leading to the west end of the island. They were so abundant there that thirty or forty could be seen at almost all times. Its flight was more like that of the *H. horreorum* than the *H. bicolor*. They generally followed the road up and down, seldom flying high but skimming along near the ground. I did not succeed in finding their nests, and could not ascertain whether it bred on the island or not. I killed no specimen after the 28th of April; up to this date the genital organs exhibited no appearance of excitement. The stomachs of those dissected contained almost entirely small dipterous insects, some of them extremely minute.

Description. Adult male.—Bill rather long; tail deeply forked,

but with the outer feather not attenuated; tarsi and feet rather robust. Head, neck, and back, of a beautiful velvety green with a slight shade of olive, almost precisely the same as the green of the *H. thalassina;* a black band from nostril to the eye. Upper tail coverts, wing coverts, and secondaries, bright steel blue, the primaries and tail feathers more or less greenish, and the feathers of the latter very narrowly margined externally and more widely internally, except toward the tips, with whitish. Below snowy white. Bill black; tarsi and feet dark horn color. Length, .155; to end of claws, .122; to end of wings, .189; extent, .292; wing from flexure, .112; tail beyond wings, .012; length of tail, .069; difference in tail feathers, .028; tarsus, .009; middle toe, .01, its claw, .0052; hind toe, .005, its claw, .005; outer toe, .008, its claw, .0037; inner toe, .007, its claw, .0037; bill along ridge, .0062; gape, .015; depth of bill, .0022; breadth, .0055; length of nostril, .001; breadth, .0007. Adult female — Plumage much less brightly colored than in the male; the green on the forehead dusky, and the tertiaries narrowly margined with whitish. The white of the lower parts less pure; a little dusky on the breast and fore neck, and cinereous on the flanks.

Lanivireo crassirostris. This species of Vireo is, I think, undescribed. It is not a common bird; three specimens were all I obtained. When first seen I mistook it for the white-eyed Vireo. I noticed nothing remarkable in its habits. All the specimens procured were actively engaged in hunting insects in small trees in the midst of a clearing about three miles from the city, on the road leading to the south side of the island. The first specimen was procured in March; the other two, a pair, in May.

Description. Adult male — Above bright yellowish olive washed with gray; upper tail coverts rather more greenish than the rest; a spot of bright sulphur yellow from nostril to the eye, narrowly encircling the latter. Wings brownish, with the outer margins of the primaries and some of the secondaries greenish olive; two very distinct pale yellowish white bands across the wings, formed by the tips of the coverts; the posterior continuous with a longitudinal band of the same color formed by the edges of the secondaries next the body. Tail brown, with the margins of the feathers olive green. Below pale sulphur yellow, with the

flanks and sides of neck shaded with dusky, the latter color slightly washed across the breast. Tarsi, dark horn color. Bill: upper mandible, dark horn color; lower, pale horn color. Length, .126; to end of claws, .134; to end of wings, .136; extent, .185; wing from flexure, .058; tail beyond wings, .032; length of tail, .047; tarsus, .0175; middle toe, .0115, its claw, .006; hind toe, .008, its claw, .007; outer toe, .009, its claw, .0052; inner toe, .007, its claw, .0055; bill along ridge, .012; gape, .017; depth of bill, .0045; breadth, .005; nostril, .002 in length, by .0007 in breadth. Spurious quill a little more than half the length of the second; 4th and 5th equal and longest; 6th nearly equal to the 3d, and .0015 shorter than the 4th; 2d .007 shorter, and 1st .026 shorter than 4th; 2d equal to 9th; 7 transverse scales on the anterior part of tarsus. Adult female resembles the male in proportions, but the colors are so faded and the feathers so much worn that the upper parts are grayish, with hardly any olive tint. The white border of the secondaries almost invisible except on the inner feather; the bands formed by the tips of the coverts are white; the yellow spot in front and around the eyes still conspicuous, though pale,—the lower parts much paler. A second male, shot in March, is probably a young bird, as the plumage is intermediate between the adult male and female.

Vireosylvia altiloqua. Very abundant, arriving about the 1st of May. The note of this bird did not appear to me to resemble the syllables Whip Tom Kelly more than any other, though this phrase might be introduced as part of the note, pronouncing the first syllable very distinctly, and terminating with an additional note longer than any, thus, — Whĭp tŏm kĕllў pheūū, and frequently still another long note, wheūū. The note varies, however, though this is the most common one. I procured seven specimens, all males. I think the female had not arrived by the 13th of May. As this is a rare bird in the United States, I give below measurements of the largest and smallest of the seven.

	♂	♂
Length	.171	.158
Length to end of claws . . .	.169	.152
Length to end of wings . .	.198	.185
Extent	.250	.215

	♂	♂
Wing from flexure	.082	.076
Tail, beyond wings	.030	.030
Tail	.060	.058
Tarsus	.0172	.0155
Middle toe	.012	.011
Middle toe claw	.0065	.006
Hind toe	.0075	.0075
Hind toe claw	.0085	.0075
Outer toe	.0105	.009
Outer toe claw	.005	.0047
Inner toe	.008	.0075
Inner toe claw	.0055	.0055
Bill, along ridge	.016	.017
Gape	.021	.021
Depth of bill	.0042	.0042
Breadth of bill	.0045	.0045
Length of nostril	.002	.002
Breadth of nostril	.001	.001
Difference of tail-feathers	.001	.001

Mimus rubripes. This bird did not seem to me to be very abundant. I met with only three specimens, all of them in the neighborhood of Nassau. It does not belong properly in the genus *Mimus*, though placed there by modern systematists. It is called by the inhabitants Blue Jay and Blue Thrasher.

Mimus Bahamensis. Although I have ventured to name this bird, I am not sure that it will not prove to be identical with *M. Gundlachii* of Cabanis; not, however, from its resemblance to his description, but from the locality whence that was procured,—one of the small kays on the north side of Cuba,—rendering it highly probable that it had flown there from some of the neighboring Bahama islands. This bird is equal, if not superior, as a songster, to our common species. It is the most universally distributed, though not the most abundant bird that I met with. On those kays which are barely large enough for any land birds to inhabit them, this bird is sure to be the first settler; and on some of them, as the Ship Channel kays, for instance, which are only a few acres in extent, there would be two or three pairs, each occu-

pying its own domain, which it did not allow to be invaded by the others without giving battle at once. It was singular as well as pleasing to see and hear, on one of these lonely and almost desert kays, this graceful bird mounted on the topmost spray of some dwarf shrub, singing with as much fervor and satisfaction as if surrounded by listeners, instead of having for sole auditor his faithful mate. The pairs seem to keep together after the period of incubation has passed, as all I met with as early as February were mated, and the inhabitants stated they did not lay before May, and the sexual organs of all those dissected by me showed no appearance of excitement. In its habits it differs very much from our common species, delighting as much in solitude as the latter does in the society of mankind. Its food during my visit consisted almost entirely of the fruit of the prickly-pear, with the addition of an occasional insect. I presume that the insectivorous part of its diet is proportionally greater when it inhabits the larger islands; but on the barren kays on which I procured my specimens, insects are almost unknown, at least if I am to judge from the number seen by myself. The stomachs of all those procured by me contained a quantity of the seeds of the prickly pear, and a few remains of insects, and the feathers near the bill of all of them were stained red by the juice of the fruit. Near Nassau I saw but two individuals. *Description.* Male: form and general appearance more robust than that of the *M. polyglottus.* Plumage above cinereous rufous brown. The rufous tint most marked on the rump and upper tail coverts; all the feathers striped down the centre with dark brown, the stripes largest on the back, and best defined on the head, and nearly or quite obsolete on the rump; a superciliary stripe of the same from the nostrils gradually vanishing towards the hind head. Cheeks white, with the tips of the feathers blackish-brown,—ear coverts whitish, with the tips and margin of the same color as back. Wings dark brown, with the edges of the outer webs of the quill feathers whitish ash; greater and middle wing coverts tipped with whitish, forming two bands across the wing; a dark linear spot of blackish brown runs down the centre of each of the middle coverts, and projects into the white of the tip,—this is also faintly indicated in the greater coverts. Tail cinereous brown; all the feathers edged with a lighter shade as if faded. The tips of the four outer feathers white,—this color

extending about twice as far on the inner as on the outer webs; the 5th narrowly tipped with the same color, and the two central feathers entirely cinereous brown. Throat slightly rufous white, a few of the feathers tipped with blackish brown, forming on each side a pretty distinct beard stripe; breast pale cinereous, with a very small spot of a darker shade near the tips of most of the feathers; abdomen white; flanks drab, very distinctly striped with blackish brown down the centre of each feather; crissum same as flanks, with the streaks not so distinct. The feathers that cover the shoulders when the wings are closed have a decided rufous tint; legs dark horn color; bill black; 1st quill a little more than half of the length of the second; 5th the longest; 4th, half a millimetre shorter; 6th, 2 shorter; 3d, 1½; 2d, 12; and 1st, 46 shorter than the 5th; 2d shorter than the 7th, and longer than the 8th. The female does not differ from the male in the color of the plumage,—one specimen is brighter than any of the males I procured. Dimensions :—

	♂	♀
Length	290	282
Length to end of claws	260	255
Length to end of wing	282	273
Extent	380	375
Wing from flexure	120	120
Tail, beyond wing	90	95
Tail	134	131
Tarsus	36	37
Middle toe	25	25
Middle toe claw	9½	9
Hind toe	13	12
Hind toe claw	12	12
Outer toe	18	18
Outer toe claw	6½	7
Inner toe	15	15
Inner toe claw	7	8
Bill, along ridge	23	22
Gape	29	30
Height of bill	6½	7
Breadth of bill	7	6½
Length of nostril	2	2

	♂	♀
Breadth of nostril	1½	1½
Difference of tail-feathers . .	22	23

Cabanis distinguishes *M. Gundlachii* from *M. saturninus*, with which he compares it, first, by its having the spots on the flank fainter,—in the present bird they are, if anything, more distinct; secondly, by the tips of the tail-feathers being much more narrowly marked with white, diminishing gradually toward the centre,—in the present bird the first four feathers are almost equally marked with white, the 5th very slightly so, and the 6th not at all. In one specimen the white is actually broader on the 4th than on the 1st feather.

Certhiola flaveola. One of the most abundant birds, and found on most of the kays, the mocking-bird only being more generally met with. It had not commenced laying by the middle of April. Judging from the quantity of empty nests seen, it must have the same habit as many of the wrens, of making more nests than it can occupy. The nests were pensile, formed of the fibres apparently of the cocoa or some other palm. The entrance is at the side, near the top. All those seen were on small bushes not higher than the head from the ground. On my arrival at Nassau, the leaf of life (*Verea crenata*) was in full bloom, and these birds seemed to derive their whole sustenance from the insects found in its flowers. These it did not procure by inserting its bill into the flower, but by thrusting it through the petals. After these flowers had disappeared, I saw them in large numbers about the sour oranges, devouring the juice and pulp of the fruit, and also the small insects attracted there. The common name of this bird is Banana bird. Though a well-known bird, still, as it has been but recently added to the fauna of the United States, I think a description of the recent specimen might be desirable, and accordingly subjoin it.

Male: plumage above fuliginous; rump bright chrome yellow; a broad superciliary white stripe from the nostril ending abruptly at the hind head. Wings and tail the same color as the back;—the former with the base of the primaries white, forming a large bar of this color on the wings, and the edges of all the quills whitish; the latter with a white spot at the tips of all but the middle

feathers, gradually growing smaller toward the centre of the tail. Below white, scarcely soiled with ashy on the throat, and more decidedly so on the flanks. The white ascends on the side of the neck on each side just above the shoulder, forming a widely interrupted collar. In the female the colors are less vivid. Dimensions :—

	♂	♀
Length	130	122
Length to end of claws	144	126
Length to end of wings	150	140
Extent	208	198
Wing from flexure	65	65
Tail, beyond wing	22	18
Tail	45	44
Tarsus	16	16
Middle toe	11½	11
Middle toe claw	6½	5½
Hind toe	7	7
Hind toe claw	7¾	6½
Outer toe	8	8
Outer toe claw	5	4
Inner toe	7½	7
Inner toe claw	5½	4½
Bill, along ridge	15	13
Gape	15½	14
Depth of bill	3½	3½
Breadth of bill	4	4
Length of nostril	1½	1½
Breadth of nostril	¾	¾
Difference in tail-feathers	4	4

4th quill longest; 2d and 3d scarcely shorter and nearly equal; the 1st 4 millimetres shorter, and equal to the 6th; the 2d, 3d, 4th, and 5th sinuated on the outer webs. Tail slightly rounded. Tarsi with 5 scutella in front. Tongue divided for half its length, and terminated by a pencil of hairy filaments; œsophagus 3 in length, 2 in breadth; proventriculus 8 by 2½; gizzard 7×5½×3 in its principal diameter; intestine 155 in length, the duodenum not plainly marked, but apparently about 40 in length; 2 small

cæca ¾ in length, of an oblong form. Pancreas, with only one lobe. Liver, large; the right lobe 14 × 5½ × 3 in its principal diameter; the left lobe, 10 × 6 × 3. Contents of the stomach, small insects, and in one case, the skin of a small larva, about three quarters of an inch in length.

Spermophila bicolor. This is the little Bahama sparrow of Catesby. It takes the place, at Nassau, of the *F. socialis* with us, and is equally unsuspicious and domestic in its habits. In the town, they were much more numerous than in the environs. I do not remember seeing any at a distance from the road. It is called Parroquet by the inhabitants.

Spermophila violacea. This bird certainly does not belong in the same genus as the *bicolor.* It is placed by Bonaparte in the genus *Pyrrhulauda,* which I have, however, been unable to find described, and have therefore left it as placed by Gray. This sparrow is quite showy, and abounds in the environs of Nassau; its principal food, at the time of my visit, was the chicken-pea; these it shells with ease. It is called Spanish Parroquet by the inhabitants.

Dolichonyx orizyvora. On the evening of the 6th of May toward sunset, I saw a number of flocks of birds flying to the westward, and counted nine in all. This was on Friday. The next day the country was filled with Rice Birds, as they are called there, and boys and men, in large numbers, turned out to shoot them. I examined a quantity of them, all of which were males in full plumage. Numerous flocks still continued to arrive during this day and Sunday. On Monday, among those shot were many females. On Tuesday, only a few were to be seen, and on Wednesday they had entirely disappeared.

Agelaius phœniceus. A friend brought me a young male of this species on the 1st of March, one of three seen by him.

Columba leucocephala. This bird is a constant resident, though not frequently seen in the winter, at which time it is much less gregarious in its habits than in spring and summer. The number is probably augmented during and after the breeding season by birds that have passed the winter farther south. It breeds in communities, in some places, as at Grassy Kays, Andros Island, in vast numbers; here the nests were made on the tops of the prickly-pear, which cover the whole kay. At the Biminis and Buena-

vista Kay, Ragged Island, on the mangroves; and at Long Rock, near Exuma, on the stunted bushes. I do not think they ever select a large kay for their breeding place. The eggs are laid by the middle of May, and the young leave the nest about the 1st of July; previous to which, great numbers are killed by the negroes. It is a shy bird when not breeding, even in the most uninhabited localities. Its food consists entirely of berries and fruits. It is called simply Pigeon.

Zenaida amabilis. The Zenaida Dove, though more seldom seen than the former species, is still by no means rare. It never collects in flocks, not breeding in communities, like the *C. leucocephala.* In its habits it is intermediate between the *Z. Carolinensis* and the *C. passerina.* It feeds and passes the principal part of its time on the ground, and when flushed, flies off in a straight line, very much as the common quail. The crops of those killed by me were filled with small seeds, about the size of a mustard seed, apparently all of the same kind. All the nests I saw were made in holes in the rocks, and consisted, as is always the case in this family, of but a few sticks. I do not know whether it migrates farther south during the winter or not; it was certainly much more abundant in May than at any previous time.

Chamæpelia passerina. Abundant everywhere, even on the smaller kays. It is, next to the banana bird, the most universally distributed.

Ortyx Virginianus. Common at Nassau, where it has been introduced from the United States, within the memory of individuals now living. It resembles, in every respect, the southern specimen of this bird from the United States.

Ardea egretta. A few seen.

Ardea candidissima. More abundant than the *A. egretta.*

Ardea herodias. Abundant.

Ardea cœrulea. The most common species of heron. From the rocky nature of the kays, and the general absence of marsh grounds, I had been led to suppose that birds of this family would be rare; but this was by no means the case.

Ardea virescens. Abundant; building in the same manner as in the United States. Eggs laid by the 1st of May.

Nycticorax violaceus. Very abundant everywhere. Nests made by April 20th; eggs laid by May 1st. In some places there were

a number of nests in the same locality; generally, however, not more than two or three; still more frequently a single one.

Platalea ajaja. A few seen at the Biminis; said to breed there by the inhabitants, but I did not succeed in finding any nests.

Phœnicopterus ruber. The Bahamas are a favorite resort of these birds. I saw immense numbers of them at different places. One of my objects in going to the Bahamas, was to be able to visit their breeding-places; but, unfortunately, the state of my health rendered this impossible, as I was unable to make the necessary exertion. In the "Naturalist in Bermuda," I saw it stated, that this bird does not sit on the nest with its legs hanging down on each side. All the persons that I asked about this, and they were quite a number, including the Hon. Judge Lees, a most intelligent man, gave the same account of the nidification of this bird; namely, that the nest is built of clay or marl, and that it is raised gradually, the bird waiting for one layer to dry before applying another; and when completed it forms a cone, very much in the shape of a sugar-loaf, slightly excavated on the top, and that the bird sits on it with its legs hanging down on each side. The breeding-places are in shallow lagoons, generally at a distance from the shore, and as the bottom is a tenacious clay, they can only be approached with great exertion. I heard of three breeding-places,—one at the Bight of Bahama, a second at Andros Island, and the third at Inagua.

Ægialites vociferus. Very abundant during the winter.

Ægialites semipalmatus. Common till May.

Ægialites melodus. Resident through the year; abundant.

Ægialites Wilsonius. Resident through the year; abundant.

Squatarola Helvetica. Rather common. I saw none in spring. Several that I shot were in the plumage of the young bird.

Hæmatopus palliatus. Abundant wherever there were sandy or gravelly beaches; resident and breeds there.

Strepsilas interpres. One large flock seen April 26th, at Green Kay, near Andros, all in full spring plumage.

Himantopus nigricollis. A few seen near the Salt Pond.

Gallinago Wilsoni. Tolerably abundant in suitable localities.

Tringa Wilsoni. Abundant around the Salt Pond as late as the 25th of April.

Tringa semipalmata. Abundant around the Salt Pond as late as the 25th of April.

Symphemia semipalmata. Abundant; resident; breeding in all suitable localities. Called Duck-snipe by the inhabitants.

Rallus crepitans. I saw a few specimens, but as I did not visit those places where they would be most likely to be found, did not see as many as I otherwise should. I frequently heard another species of rail, but did not see it; having no dog, I was unable to flush it.

Fulica Americana. Abundant, and resident the whole year.

Gallinula galeata. " " "

Gallinula Martinica. I think that this bird must be common, but I met with but one specimen.

Dendrocygna arborea. Common, and breeds on the southern island. At Nassau it was common, but did not breed there.

Anas boschas. Common during the winter.

Nettion Carolinensis. " "

Querquedula discors. " "

Fulix marila. " "

Fulix collaris. " "

Aythya Americana. " "

Erismatura rubida. " "

The four last species are seen in immense flocks, sometimes acres in extent. The Red-head seemed to be the most abundant.

Pelecanus fuscus. At the Biminis the Brown Pelican was numerous, and breeding on the mangroves, in the same manner as in Florida. On the 20th of February, the young were hatched in some of the nests, and incubation was advanced in all of them. I did not meet with the bird anywhere else. The development of the air-cells is greater in this bird than in any other that I am acquainted with. On touching it while alive, a distinct crepitus is felt and heard, as if it were emphysematous; all the bones, with the exception of the phalanges of the toes, contain air. It possesses much more intelligence than I gave it credit for. A tame one, belonging to the Colonel of Engineers at Nassau, was in the habit of going every morning to the fish-market. Fish are always sold alive, and, in order that the purchaser may select them, are taken out of the water and spread before him; this was the moment for the Pelican, and, if he had been as active as he was voracious, he would have fared well; but, unfortunately for him, the fishermen were generally too quick, and, seizing him

by his long beak, would throw him into the water, where he would remain for some time, looking with great solemnity at his persecutors, and then return to try his luck again. As I was passing by his owner's house one day, he commenced tugging at my trousers with his bill; at first I did not understand what he wanted, but noticing that the gate was shut, thought it possible that he might wish it opened; this I accordingly did, and he walked in at once, without stopping to thank me. This bird was in immature plumage, probably not more than a year old.

Sula fiber. In a former article, I stated that I thought Audubon was mistaken in saying that this bird breeds at the Tortugas. I am now positive that he was so. The time at which they lay their eggs, and the manner of constructing, or rather not constructing, their nests, is entirely at variance with his account; in which, as I before stated, he has mistaken the nests of the Brown Pelican for those of the Booby. The Boobies, as well as the Dusky Petrels, always seek their food on the blue water; at least I never saw one on the bank; and, as the distance across the gulf is so short, they probably feed nearly as much on the Florida as on the Bahama side; and it is almost impossible that, agreeing as they do in their manner of breeding wherever I saw them at the Bahamas, they should so change their habits at the Tortugas. The eggs are laid, in most cases, by the 1st of February; the bird makes no nest, not even an excavation in the soil. The eggs are deposited indifferently on the sand, grass, or bare rock. My first visit to one of their breeding-places was made on the 10th of April, at St. Domingo Kay, which lies thirty-three miles south of Great Ragged Island, and is at the very extremity of the southern point of the bank, entirely out of the range of vessels of any kind, and is probably never visited, except occasionally by people from Ragged Island, who go there to collect the eggs of the Noddy. The kay is about three or four acres in extent, so low that in storms it is entirely washed by the waves. It can only be approached at one spot, and that only in calm weather. At the time of my visit, it was literally covered with Boobies, mostly young ones; of these, by far the greater part were fully fledged, and could fly with ease, but were still dependent on the parent birds for food. They kept by themselves, and were perched upon the rocks all around the edge of the kay. The

younger birds were sprinkled all over the kay, wherever there was room for them, and of all ages, from those almost able to fly, to young ones but that moment hatched. I found the eggs of some twenty pairs, most of them on the point of hatching. The number in every case was two, though only one is usually attributed to them. In appearance they resemble those of the family generally, being greenish, covered with a chalky substance. In size they vary considerably, as also in form, the most elongated one measured .067 in length, by .038 in breadth; and the broadest, .055 by .040; the others varying between these two extremes, but averaging more nearly like the latter. The young, when first hatched, are entirely naked, and of a livid blue color; they soon become covered with a white down, then the quills and tail-feathers make their appearance, of a cinereous-brownish color, then the feathers of the body, neck, and head; and lastly, of the throat. On our landing, some of the old birds flew off, but by far the greater number remained, and did not trouble themselves to get out of our way, but on being approached too nearly darted at us with their powerful bills in a most savage manner. They seemed to be very quarrelsome in their disposition, continually striking at each other, not at all in an amicable manner, but as if they intended to do all the mischief in their power. How the different birds recognized their young was a mystery to me, as they apparently did not remain in the same place after they had attained any size. Besides St. Domingo Kay, I visited a number of other breeding-places, all of which resembled the one described, except in being more elevated above the water. The Booby is, I think, the most expert diver that I am acquainted with; no matter in what position it may be, whether flying in a straight line, sailing in a circle, just rising from the water, or swimming on the surface, the instant it sees its prey it plunges after it. I have frequently seen one dive from the wing, rise to the surface, and dive in rapid succession five or six times; and on taking flight again dive before it had risen more than two or three feet from the surface, and perhaps catch a dozen fish in the space of a minute. There is nothing graceful in its style; it is apparently work, and not pleasure. On one of the kays I visited, called Booby Kay, near Green Kay, I saw a great number of a species of *Anolis*, of a dark, almost black color, entirely unlike any seen elsewhere,

but they were so timid, and active in their movements, that I could not procure a specimen. The stomach contained a great many varieties of fish; among them a cottus, a parrot-fish, flatfish of two species, and some large prawns; but their principal food seemed to be flying-fish, and a species of *hemirhamphus*.

Dissection. Heart large. Right lobe of liver, as usual, the largest; .085 in length, by .040 in breath. Left lobe .052 in length, by .025 in breadth. Gall-bladder elongated, and rather large. Pancreas lying between the two folds of the duodenum. Stomach enormous, occupying nearly the whole left side of the abdomen, extending from the heart to the cloaca, measuring, when entirely empty, .10 in length, by .06 in breadth. Intestines very large, 1.5 in length; cæca very small. The difference between the digestive organs of this bird and the fish-hawk is very marked, and is a good example of the various ways that nature takes to effect the same purpose; the food of both birds being the same. The intestine of the fish-hawk, which is the smaller bird, measuring 2.8 in length, nearly twice that of the booby, while its diameter is not more than one half as great.

Sula dactylatra, Lesson? Lesson's description of this bird is not sufficiently full to enable me to decide, with certainty, whether it is the same as those I procured at the Bahamas. If it should prove to be a new species, the name *elegans* would be appropriate, as it is the prettiest of the genus. In dimensions, it is about the size of the *Sula fusca*, but heavier and more muscular. I found them breeding but at one place,—St. Domingo Kay,—and there only some twenty pairs. They apparently lay their eggs later than the booby, as the largest of the young were not more than half grown, and the eggs of several were freshly laid. As in the booby, the number of the eggs was two. They were whiter than those of the latter bird, the chalky covering being much thicker, and did not differ as much in size or proportions; the two extremes measuring .066 by .045 and .062 by .044. They did not associate with the other species. The young birds and eggs were all in one part of the island. When half fledged they are very pretty, the snowy-white down with which they are covered forming a striking contrast with the dark brown of the tail and wings then just appearing. Their habits are precisely the same as those of the boobies, and their internal structure presents no appreciable difference.

Description. Sexes similar. Form more robust than that of the *S. fiber*. Secondaries and tertiaries rich brown, the primaries of the same color, but darker; some of the coverts of the primaries brownish; tail with the feathers below, brown, above hoary, the two middle feathers the most so, and the base of all white or whitish. All the rest of the plumage snowy white. Bill horn color, with the serrations of the upper mandible very distinctly marked. Iris pale yellow; naked skin around the bill, eyes, and throat, black. Tarsi and feet, yellowish-green. Measurements: —

	♀
Length	.796
" to end of claws	.768
" " wings	1.185
Extent	1.6
Wing from flexure	.435
Tail, beyond wings	.028
Length of tail	.165
Difference of tail-feathers	.075
Tarsus	.044
Middle toe	.074
" " nail	.019
Hind toe	.027
" " nail	.008
Outer toe	.08
" " nail	.01
Inner toe	.053
" " nail	.01
Bill, along ridge	.108
Gape	.128
* Depth of bill	0.33
* Breadth	0.25

Tachypetes aquilus. I found a few Man-of-war birds breeding at the Biminis; their nests were placed upon the mangroves, amidst those of the brown pelican and Florida cormorant. As these birds are much disturbed by the inhabitants, their breeding-places will probably be given up in a few years. On the central

* At the deepest part of the bill, there are no visible nostrils.

and highest part of Booby Kay, a colony of about two hundred pairs was breeding. The nests here were on the bare rock, and closely grouped together; the whole not occupying a space more than forty feet square. There were no boobies amongst them, though thousands were breeding on the kay. The largest breeding-place visited by me is situated on Seal Island, one of the Ragged Island Kays, and is five or six acres in extent. The nests, thickly crowded together, were placed on the tops of the prickly-pear, which covered the ground with an almost impenetrable thicket. On the 8th of April, the young were hatched in half of the nests, the largest about one third grown; the other nests contained eggs more or less hatched; out of many hundreds, I only procured seven that were freshly laid. I have visited the breeding-places of many sea-birds before, and some well worth the trouble, but none so interesting to me as this. It was a most singular spectacle; thousands and thousands of these great and ordinarily wild birds covered the whole surface of the prickly-pears as they sat on their nests, or darkened the air as they hovered over them, so tame that they would hardly move on being touched; indeed, the specimens that I procured were all taken alive, with my own hands. When I had penetrated as far among them as possible, I fired my gun; the whole colony rose at once, and the noise made by their long and powerful wings striking against each other was almost deafening. In a moment they commenced settling upon their nests, and were soon as quiet as before. Incubation is carried on by both male and female. The old ones feed the young at first by regurgitation. The food consists of the same species of fish as the booby's, and is principally derived from that bird, which they rob as the bald eagle does the fish-hawk. Why the booby should submit to this, being much more powerful, and armed with a most formidable bill, is strange. I have watched these birds for hours, while flying, and every now and then hovering over the surface of the water, but never saw them catch a fish. The popular idea at the Bahamas is, that the fish are stupefied by the excrement of this bird. If there is any foundation for this idea, I presume it is that the fish are attracted by it; though the abundance of fish is such, that one would think it hardly worth while to attract them in any way. The young are at first nearly naked, then covered with white down, and by

the time they are the size of a pigeon have the bronzed-black scapulars so developed that they look, whilst sitting on their nest, erect on their tarsi, as if they had on cloaks. They were not quarrelsome in their disposition, like the boobies; frequently one would alight on a neighboring nest, without being disturbed by the owner. The single egg, which is white, is large for the size of the body, pretty uniform in shape; those picked out of some hundreds, as extremes, measured, the first, 69½ × 50; the second, 66 × 44½; the third, 61½ × 45. The intestine of this bird is proportionally still shorter than that of the booby, measuring only .850 in length. The stomach .80 in length; the division into the proventriculus only marked by the belt of glands, and the diameter of it, as well as of the œsophagus, apparently the same as the stomach. The liver is much smaller than in the booby, the right lobe measuring .036 by .032, and the left .04 by .025. Pancreas not observed; spleen small. Two small globular cæca .09 from anus.

Graculus Floridanus. At the Biminis cormorants were very abundant; nesting on the mangroves, as in Florida. On the 20th of February, in some of the nests the young were nearly fledged, whilst in others the eggs had not been laid. None were seen at any of the other kays.

Phäeton flavirostris? The description of the habits of this bird given in "The Naturalist in Bermuda" is so accurate, as to render a detailed description superfluous. I visited three breeding-places. At Long Rock, near Exuma, they breed in holes in the horizontal surface of the rock, as also at Water Kay, one of the Ragged Island Kays; at Kay Verde, which is situated about thirty miles east of Great Ragged Island, in holes in the perpendicular face of the cliffs, and also in the horizontal surface of the rock. Before depositing their eggs, the male and female occupy the same hole, but afterwards only one bird is found in a hole. Both sexes incubate. On the 20th of April, about half of the birds had not commenced laying, and a few of the eggs had been sat on for three or four days; most of them, however, were freshly laid. They feed from near daylight to about nine o'clock, when they return to their holes, in which they pass the hotter part of the day, again leaving them toward sunset in search of food. They cannot, of course, breed in communities like the tern, as

suitable holes are not very abundant. At Water Kay, where they were more abundant than at any other place, in an extent of two miles only eleven birds were found. The holes chosen for their abodes are seldom shallow, and are often so winding that, though their harsh note can be heard, they can only be procured by demolishing the rock. In their habits, except that of diving, which I am ignorant whether they practise or not, they closely resemble the terns, as they also do in their mode of flight and external appearance; and with that family they should be associated.

On their breeding-places being approached, when they are out of their holes, they hover over the intruder, screaming and darting at him in precisely the same manner that the terns do. The long tail-feathers are never separated when flying, and the French name "paille en queue" is very expressive. I procured a single specimen with a pale straw-colored bill; it was a male, the plumage nearly pure white, much more so than in any of the orange-billed birds, and the fifth primary had the black narrowly edged externally with white, the whole length. I am not prepared to say that this bird, which agrees, with the exceptions above mentioned, with the other, is a different species, and if so, which of them is the *flavirostris* of Brandt. The orange-billed specimens were both male and female, and there was no external peculiarity by which the sex could be determined. The figure in Gray's "Genera" of this bird is very good. My specimen agrees generally with Mr. Geo. N. Lawrence's description, in the 9th volume of the Pacific Railroad Report. They are precisely alike in their markings, varying only in the shade of salmon, which is always deepest on the long tail-feathers and next on the back and hind neck. The tarsus and hind toe are not yellow, but flesh-colored, and this color extends obliquely across the foot from the basal extremity of the outer toe to the end of the 1st phalanx of the inner toe. There is no black that I can discover at the base of the 6th primary, though its shaft, as well as those of all the others, is black except toward the tip. The white tips of the five outer primaries diminish in extent from the 1st to the 3d, and then again increase to the 5th. The single egg is large for the size of the bird, whitish, covered almost entirely with reddish chocolate colored spots finely dotted over the surface, which

can be easily rubbed off. The small number that I procured were of nearly the same form and dimensions. One of them measured .053 in length by .042 in breadth; in shape very similar to a common hen's egg. The eggs were sometimes deposited upon the bare rock and sometimes on a few twigs, which had however the appearance of having accidentally fallen into the hole. Measurements: —

	♂*	♂	♀	♀
Length	.830	.785	.740	.790
Length to end of claws	.350	.367	.350	.345
Length to end of wings	.632	.620	.622	.633
Extent	.945	.930	.925	.960
Wing from flexure	.290	.280	.274	.290
Tail beyond wings	.410	.400	.335	.380
Length of tail	.528	.495	.450	.495
Difference of tail-feathers	.476	.435	.400	.430
Tarsus	.019	.022	.022	.020
Middle toe	.036	.034	.033	.032
Middle toe nail	.011	.010	.009	.010
Hind toe	.014	.012	.013	.012
Hind toe nail	.007	.005	.005	.006
Outer toe	.035	.032	.032	.032
Outer toe nail	.008	.007	.008	.009
Inner toe	.029	.027	.027	.026
Inner toe nail	.010	.008	.008	.009
Bill along ridge	.055	.051	.051	.052
Gape	.077	.074	.067	.072
Depth of bill	.018	.018	.016	.017
Breadth of bill	.009	.008	.008	.007
Length of nostrils	.005	.005	.005	.005
Breadth of nostrils	.0012	.0012	.0012	.0012

Dissection. Neck very muscular. The sternum and ribs, which are very strong, cover the greater part of the abdomen. The ribs extend backwards .03 from the posterior edge of the sternum. There are seven sternal ribs, the 7th arising from the 6th; they are united with the seven posterior dorsal. There

* This specimen is the one with the light yellow bill.

are nine dorsal ribs, the anterior very short, only .016 in length; the second nearly as long as the third. The crest of the sternum projects very much anteriorly, and its height is four fifths of its length. The external border of the base is concave, somewhat in shape like that of the woodpeckers. The furcula is strongly united to the crest of the sternum, and in consequence of the great projection of the part is nearly perpendicular in its direction. The great pectoral is very much developed, arising as usual from all the crest of the sternum not occupied by the middle pectoral,—from the posterior edge of the base, leaving a large irregularly quadrilateral surface, which does not give origin to any muscular fibres,—from the anterior and external surface of the furcula, and from a bow-shaped space of the interfurcular aponeurosis .005 in height at the centre. The middle pectoral arises by a triangular-shaped head from the space comprised by a line drawn from the superior edge of the furcula to the posterior end of the union of the crest with the base, and from this last point to the linea aspera of the coracoid,—from all the interfurcular aponeurosis above the bow-shaped space giving origin to the great pectoral,—and from the inferior and inner posterior two thirds of the coracoid. Œsophagus large, .130 in length by .020 in diameter; proventriculus, .040 in length by .020 in diameter; glands very much developed; stomach, .035 by .022, walls quite thin. The contents of the stomachs of all the specimens procured, were partially digested flying-fish and the remains of a species of squid or cuttle-fish.* The right lobe of the liver, .055 in length by .025 in breadth and .015 in thickness. Left lobe, .050 by .020 by .015. In another specimen the liver was broader and shorter, the left lobe measuring only .039 in length by .029 in breadth and .015 in thickness. Gall bladder, .015 in length. Pancreas small, situated in the fold of the duodenum opposite the entrance of the ductus choledocus, .025 in length by .005 in breadth and 003. in thickness. Intestine small, .710 in length; cæca, .005 long by .004 in diameter; cloaca globular and quite large.

Thalassidroma Wilsonii. This bird, whose breeding-place has thus far escaped the researches of naturalists, I presumed would

* I had supposed these to be the mandible of some small species of fish like the parrot-fish, but they have been determined by Mr. Putnam to be those of the squid or cuttle-fish.

be found breeding at the Bahamas; but although I looked for it carefully, and inquired about it of all persons likely to have any information on the subject, I could not ascertain that it was ever seen on the kays, though occasionally one or two would follow a vessel into soundings. On my return, in the Gulf Stream, I first saw this bird about sixty miles north of Abaco, and by the next day they had become very numerous. I caught about twenty by allowing a thread to fly astern in a way well known to sailors. I saw no other species of stormy petrel.

Puffinus obscurus. On making inquiries as to what sea-birds breed on the kays, I was constantly told of a singular bird with a hooked bill that only flew during the night, and was known by the name of Pimlico; it proved to be the present species. It is very abundant, being found on all the uninhabited kays, near the channel, which are not too frequently visited by wreckers or fishermen. They breed in holes in the rock, as described in the "Naturalist in Bermuda." Near Nassau, at the Ship Channel kays, where I first met with them, incubation had already commenced by the 24th of March; the nest, consisting of a few dry twigs, is always placed in a hole or under a projecting portion of the rock, seldom more than a foot from the surface, and never, as far as my experience goes, out of reach of the hand; on being caught they make no noise and do not resist at all, unlike the tropic-bird, which fights manfully, biting and screaming with all its might. The egg does not seem to me to resemble an ordinary hen's egg; the shell is much more fragile and more highly polished. I broke a number of them in endeavoring to remove the bird from the nest. They vary a good deal both in size and form, some of them being quite rounded and others elongated; three of them measured as follows: one .059 by .036, another .052 by .033, and the third .051 by .037; both sexes incubate. Why these birds and the stormy petrels never enter or leave their holes in the daytime, is one of the mysteries of nature; both of them feeding and flying all day, are yet never seen in the vicinity of their breeding-places before dark. When anchored in the night time near one of the kays on which they breed, their mournful note can be heard at all hours of the night; during the day they may be seen feeding in large flocks, generally out of sight of land. They do not fly round much, but remain most of

the time quiet upon the surface of the water. I did not see one on the banks, and never saw them dive or apparently catching any fish, though they are often in company with boobies and different species of terns, all of which are actively employed in fishing. About half way from Andros to the Bank I saw on the 26th of April a flock of boobies, sooty terns, noddies, Cabot's tern, and the dusky petrel, that covered the surface of the water or hovered over it for an extent of at least a square mile. Their number must have been enormous.

Description of recent specimens. All the upper parts, wings, and tail, sooty brown; below, white; the boundaries of the colors not abruptly marked; bill bluish, with the tips of the mandibles black; this latter color running up the culmen to the forehead. Tarsi and feet pale flesh-color, with the posterior edge of the tarsus, the whole sole, and the upper and outer surface of the outer toe, running obliquely backward at the tarsal extremity to the hind part of the tarsus, black. Dimensions: —

	♂	♀
Length	.344	.340
Length to end of claws	.350	.345
Length to end of wings	.497	.480
Extent	.690	.666
Wing from flexure	.217	.205
Tail beyond wings	.003	.001
Length of tail	.095	.088
Difference of tail-feathers	.02	.02
Tarsus	.037	.036
Middle toe	.041	.038
Middle toe nail	.0085	.009
Hind toe*	.000	.000
Hind toe nail	.003	.003
Outer toe	.042	.041
Outer toe nail	.006	.006
Inner toe	.033	.032
Inner toe nail	.007	.0062
Bill along ridge	.035	.036
Gape	.0445	.044

* No portion of the hind toe is visible externally but the claw.

	♂	♀
*Depth of bill	.0077	.007
*Breadth of bill	.006	.0055
Length of nostril	.003	.002
Breadth of nostril	.0017	.0015

Dissection. Tongue triangular, fleshy, with fleshy barbs on the sides. Œsophagus, .395 in length by .036 in breadth when opened and spread out; proventriculus very large; it is folded on itself at an acute angle at the posterior extremity, and measures .075 in length by .045 in breadth. The gizzard is small, measuring .015 by .011 and .008 in its three principal diameters. The epidermis is thick and horny. The stomachs of all those examined, nine in number, contained a pultaceous mass highly nacreous, as if composed of the scales of a small fish, and the mandibles of a squid or cuttle-fish of much smaller size than those found in the stomach of the tropic-bird. Pancreas large, forming two or three distinct lobes. Spleen small. Liver with the right lobe measuring .04 by .02 by .009, and the left .029 by .012 by .008. On the anterior extremity of the external border of the right lobe is a prolongation in the shape of a leg of mutton, by which the renal veins enter its substance. Intestine very small, .590 in length, with two small globular cæca, .022 from the anus.

Larus atricilla. Abundant, resident, and breeding.

Sterna regia. The lower surface of the foot is orange, bordered with black; the edge not distinctly defined.

Sterna acuflavida.

Sterna fuliginosa.

Sterna Wilsoni.

Anoüs stolidus. All these species of terns are abundant, and breed on most of the unfrequented kays. The *S. fuliginosa* and *A. stolidus* in immense numbers, as at the Tortugas.

The Secretary read extracts from a letter from Mr. H. M. Lyman, of Royalton, Vt., to Dr. C. F. Winslow, in relation to the recent volcanic eruption in the Sandwich Islands.

* The depth and height of bill are taken immediately in front of the nostril.

Mr. Lyman estimated the original fountain crater to be at an elevation of about 9,000 feet above the sea. It would appear that the original outbreak was from the whole length of a fissure opening on the side of the mountain from the summit to the base, the first jet (January 23) being from the upper end of the fissure. As the force of the eruption subsided, the upper end of the fissure appears to have become clogged, so that the lava flowed only from the lower end and margin; in this way he accounts for the formation of successive cones, or active craters, one below the other, on the side of the mountain. During the first three weeks, the lava flowed in an open channel down the mountain till it reached the plateau at the base; but after this the fountain jet ceased to play with its primitive activity, the crater became clogged, the lava stream cooled on the surface for about half a mile from the original source, and at that point of emergence another cone was formed by the lava as it bubbled up from the end of the pyroduct that had been formed over the upper end of the flow.

The same process was repeated, the second orifice becoming partially obstructed, and a covered archway forming itself over the stream for a short distance below; by the middle of March a covered pyroduct had been formed over almost the whole of the lava stream. The lava does not appear to have flowed into the sea after the first week in February, but was dispersed by a network of innumerable streams traversing at random the great central plateau of the island. The amount of lava ejected has scarcely diminished from the first, though the fountain only plays at occasional intervals. The whole course of the eruption is like those of previous years.

Dr. C. T. Jackson read a letter from Mr. J. H. Blake, from Brandon, Vt., giving some further details about the frozen well, and containing a full thermometric table for that town at all seasons, from 1853 to the present time.

He also read a letter from Prof. J. Brocklesby with reference to the frozen well at Owego, N. Y., and other cold wells at different places.

Dr. White presented, in the name of Dr. Durkee, the upper portion of a human ulna, incrusted with a stalacti-

tious deposit of carbonate of lime, from a cave in California.

The specimen contained the usual amount of animal matter of old and dried bones. The entrance to the cave was accidentally discovered, and was unknown to any of the present inhabitants of the vicinity; it was narrow, about thirty feet deep, opening into the cave, from the top of which the stalactites reached to the floor, multiplying indefinitely into the darkness, and so numerous as to prevent advance. The floor sloped considerably, and the bones were found upon it among the stalactites in great quantities and in the utmost confusion, glued together in all possible ways, and very much scattered. The specimen was brought home by a gentleman who obtained it with others from the cave. The locality of the cave was not stated, neither was it known whether the bones of animals were found with the human remains.

Mr. Ordway placed upon the table severa bottles containing the crustaceans collected by Dr. Bryant in the Bahamas; there were more than thirty species, in excellent condition, perfect in all their parts, and with the localities identified. Many were new to the cabinet, and probably some were undescribed species.

Dr. C. T. Jackson exhibited specimens of a compact specular iron ore from Phillipsburg, N. J.

The specimens resembled that found on Lake Superior; it makes most excellent wire. The ore rests on the ends of deeply inclined strata of hornblendic gneiss; over it is limestone, and over this a second bed of ore,—the first of eight, the latter of ten feet thickness. Over the ore beds is a layer of white serpentine, and the gneiss is cut by veins of red feldspar containing iron ore. It is a limestone region, and the iron is of a superior quality.

Mr. E. Samuels presented a box containing twenty-four slides for the microscope, of specimens of diatoms from the intestines of *echini* from the Sandwich Islands, Port Jackson, New South Wales, Tortugas, and Florida, prepared and mounted by himself.

The variety of diatoms thus obtained is very great, opening a vast field for the student in this department of Natural History; Mr. Samuels thought that fossil echinoderms in this way would yield many interesting fossil forms. The contents of the intestines thus far have been composed of about one half *foraminifera*, the residue of diatoms, spicules and gemmules of sponges, fragments of *algæ*, and sand.

Mr. E. S. Wheeler, of Berlin, Mass., presented the nest, four eggs, and the male and female bird of Henslow's bunting (*Ammodromus Henslowi*, Aud.), obtained in that town. The birds are not common, but are occasionally heard about meadows, which they frequent; their number has increased within a few years. The thanks of the Society were voted for this valuable donation.

The Corresponding Secretary read the following letters which he had recently received, viz:—

From the Yorkshire Philosophical Society, May 3, 1859, and the Geological Society, Dublin, May 31, 1859, acknowledging the receipt of the publications of the Society; Geological Survey of India, presenting its Memoirs and asking an exchange; and from Charles M. Tuttle, June 3, and F. V. Hayden, June 8, accepting membership.

Messrs. Cornelius Cowing and Frank P. Nash, of Boston, were chosen Resident Members.

July 20, 1859.

The President in the Chair.

The President gave an account of his recent voyage to the Rio de la Plata and the Uruguay, of his crossing the Pampas and the Andes to Valparaiso, and of his return on the Pacific to Panama.

Dr. A. A. Gould presented the following:—

DESCRIPTIONS OF NEW SPECIES OF SHELLS BROUGHT HOME BY THE NORTH PACIFIC EXPLORING EXPEDITION.

PAXILLUS TANTILLUS. T. minuta, cornea, pupæformis, inornata; anfr. 6 ventricosis. Apertura circularis, labio semicirculari, incrassato, ventre callo expanso copioso induto; canali antico obliquo curto. Axis 1.25; diam. .75 millim. Inhabits Hong-Kong. W. S.

PAXILLUS LYRATUS. T. parva, pupæformis, gibbosa, flavido-virens, apice lævi, alibi laminis erectis longitudinalibus lyrata; anfr. 7 ventricosis, penultimo ampliore; suturâ profundâ. Apertura subcircularis, anticè acuta, ventre callo copioso firmato; labro duplici, lateraliter viso flexuoso. Axis 3 mil.; diam. 1.5 millim. Inhabits Loo Choo Islands. W. S.

LITTORINA VIDUA. T. parva, ovato-conica, intensè olivacea et omnino flavido concinnè tessellata, striis transversis insculpta; anfr. 5 ventricosis declivibus. Apertura pyriformis, columellâ incarnatâ; labro intus lineato. Axis 7 millim.; diam. 4 millim.

Inhabits Ousima. Very regular in form, and the reticulations are only seen on close inspection.

BULLA VERNICOSA. T. ovato-globosa, solida, lævigata, latè perforata, cinereo cum rufo variegata et fasciis 4 macularum fuscarum interdum angulatarum cincta. Apertura angusta, labro recto vix inflecto rufo marginato; fauce porcellana. Axis 1.3 poll.; diam. .8 poll. Inhabits Loo Choo Islands. W. S.

Very shining, less inflated and narrower aperture than *B. ampulla;* more globose and more polished than *B. australis.*

ATYS MUSCARIA. T. minuta, ovato-elliptica, tenuis, virescens, punctis fuscis transversim dispositis ornata, striis utrinque insculpta; vertice infundibuliformi imperforato. Apertura angusta, anticè effusa; labro retrorsum producto, dentigero; columellâ brevi, tortâ. Axis 4 millim; diam. 2 millim.

Inhabits China Seas. W. S.

ATYS PORCELLANA. T. parva, tenuis, ovato-cylindracea, lactea, striis transversis remotis utroque crescentibus arata; apice

vorticiformi imperforato. Apertura angusta antrorsum amplians, basi subtruncato; columellâ profundè arcuatâ callo valdè munitâ subperforatâ. Axis 12; diam. 5 millim.

Inhabits Kagosima Bay. W. S.

HAMINEA ANGUSTA. T. parva, tenuis, ovato-cylindracea antrorsum ampliata, obtusè rotundata, flavo-virens, striis transversis insculpta; vertice obliquè truncato subperforato. Apertura antrorsum ampliata; columellâ haud excavatâ, plicâ et callo carente. Axis 6; diam. 4 millim. Inhabits Simoda. W. S.

Resembles in size and form *H. ambigua*.

PHILINE VITREA. T. modica, fragilis, vitrea, pellucida, iridescens, rotundato-ovata, depressa, undulis concentricis sinuatis notata; apice opaco vix indentato anfractum unicum exhibente. Apertura amplissima; labro posticè rotundato; columellâ acutâ absque plicâ interiorem testæ patefaciente. Axis 10; diam. 8; alt. 3 millim. Dredged at Hong Kong. W. S.

PHILINE ARGENTATA. T. ovato-quadrata, compressa, tenuissima, lucida, talcosa, concentricè undulata et lineis transversis argentatis insculpta; apice indentato, calloso labro posticè latè exstante, anticè subtruncato; plicâ columellari obviâ. Axis 6 mill.; diam. 5 millim. Inhabits Hakodadi Bay in sandy mud, 2–6 fathoms. W. S.

Very much like *P. scutulum*, Lovèn, except in its sculpture. Distinguished from *P. vitrea* by its off-standing lip and silvery grooves.

TORNATINA APICINA. T. minuta, cylindracea, elongata, alba, lineis incrementi tenuissimis insculpta; apice mammillatâ; anfr. 4, suturâ canaliculatâ. Apertura $\frac{3}{4}$ long. testæ, perangusta; plicâ columellari obsoletâ; labro lateraliter viso arcuato. Axis 5 millim.; diam. 2 millim. Inhabits Sydney Harbor. W. S.

The aperture is broader and the pillar fold less definite than in *T. fusiformis*.

CYLICHNA VILLICA. T. minuta, ovato-cylindracea utroque subconica, albo et ferrugineo cincta, lineis volventibus insculpta et posticè concinnè plicata; vertice latè perforato. Apertura angusta, labro vix apicem excedente; columellâ subperforatâ, plicâ obsoletâ. Axis 3; diam. 1.5 millim. China Seas. W. S.

CYLICHNA ELLIPSOIDEA. T. minuta, solida, elongato-elliptica, eburnea, transversim striatula; apice involuto latè umbilicato; labro apicem vix excedente, latè arcuato. Apertura perangusta, anticè acuta; columellâ brevi, validâ, plicâ modicâ; ventre callo copioso induto. Axis 3 millim.; diam. 1+ millim. Inhabits Loo Choo. W. S.

CYLICHNA REGULARIS. T. satis magna, elliptica, elongata, alba, spiraliter insculpta, vertice obtuso latè perforato. Apertura perangusta, admodum anticè ampliata; columellâ incrassatâ, vix incurvatâ, imperforatâ; ventre calloso. Axis 9 millim.; diam. 4 millim. From Sydney Harbor. W. S.

CYLICHNA OPEROSA. T. minuta, gracilis, cylindracea, virescens, polita, vel ad basim minutissimè circumstriata; vertice obtuso, amplissimè umbilicato. Apertura angusta, linearis; plicâ columellari conspicuâ, haud umbilicatâ. Axis 4 millim.; diam. 1 millim. From Hong Kong Harbor. W. S.

CYLICHNA LÆTA. T. parva, ovata, elongata, lactea, nitida, transversim (sub lente) striata; vertice plerumque perforato. Apertura antrorsum ampliata; labro vix posticè producto; columellâ profundè incurvatâ, imperforatâ; plicâ satis conspicuâ. Axis 5 millim.; diam. 2 millim.

Inhabits Kagosima. W. S. A somewhat tumid, very symmetrical species.

CYLICHNA PROTRACTA. T. satis magna, solida, cylindracea, ossea, spiraliter insculpta; apice obliquè truncato carinato crateriformi perforato. Apertura angusta; labro recto posticè angulato; columellâ curtâ, solidâ, valdè plicatâ. Axis 12 millim.; diam. 5 millim. Coast of China. W. S.

CYLICHNA TUBULOSA. T. modica, elongata, cylindracea, deorsum sensim ampliata, albida, lævis vel potius (sub lente) lineis volventibus insculpta; vertice obliquè truncato crateriformi imperforato. Apertura perangusta, linearis; plicâ columellari conspicuâ. Axis 8 millim.; diam. vix 3 millim. Simon's Bay, Cape of Good Hope. W. S. Allied to *C. involuta*, A. Ad. but the outlines are more rectilinear.

CYLICHNA MELAMPOIDES. T. minima, solida, ovata, eburnea,

polita, anticè striis cincta; vertice obtuso, impresso, imperforato; basi acutè rotundato. Apertura antrorsum dilatata; labro vix reducto; columellâ curtâ, imperforatâ. Axis 4 millim.; diam. 2 millim. From China Seas. W. S.

CYLICHNA CONSOBRINA. T. cylindracea, abbreviata, anticè angustata, posticè truncata, solidula, albida epidermide fugacissimo induta, transversim striatula; vertice indentato, angulato. Apertura angusta, recta, labro ad apicem planulato; columellâ abbreviatâ, tortâ. Axis 6 millim.; diam. 2+ millim. Taken on the west coast of Jesso. L. M. Squires. Size and general form of *C. triticea*, but less rounded at extremities and pillar fold less obvious. *C. corticata*, Müll. is nearly the same.

ACTÆON SECALE. T. parva, elongato-ovata, tenuis, straminea, posticè polita vel lineâ subsuturali insculpta, anticè striis punctatis cincta; anfr. 4 tabulatis ultimo $\frac{3}{4}$ long. testæ; apice obtuso. Apertura $\frac{1}{2}$ long. testæ vix superans, auriculata, posticè acuta, anticè benè rotundata; columellâ conspicuè tortâ. Axis 4 millim.; diam. 2 millim. From the China Seas. W. S.

BUCCINULUS STRIGOSUS. T. ellipsoidea, elongata, solidula, sulcis volventibus punctatis arata, interspatiis fusco et albido catenatis, et fasciâ albidâ medianâ, suturali et anticali ornatâ; anfr. 5, ultimo $\frac{3}{4}$ long. testæ adæquante. Apertura $\frac{2}{3}$ long. testæ, perangusta; columellâ profundè excavatâ. Axis 8 millim; diam. 3 millim. Inhabits Loo Choo and Kagosima. W. S.

Remarkable for its small size and slender form. Some specimens are much shorter than others and nearly without the slaty lines; so that the species appears to be quite variable.

LIOTIA SOLIDULA. T. ovato-conica, depressa, solida, albida, modicè umbilicata ad 12-plicata, lirâ ad peripheriam, alterâ subsuturali, alterâ basali foveata; umbilico dentato; anfractibus quinque. Apertura verticalis; columellâ tenui, profundè abditâ; labro crasso simplici. Axis 5 millim.; diam. 8 millim. Dredged in 25 fathoms off the coast of China. W. S. Allied to *L. Peronii* and *L. cidaris*, but differing in the umbilicus.

LIOTIA LOCULOSA. T. parva discoidea, solida, cinerea; anfr. 4 citò crescentibus, benè discretis, ultimo ad peripheriam biangu-

lato, costis ad angulos tubuloso-nodosis lyrato; suturâ crenulatâ; umbilico amplo, profundo, crenulato. Apertura circularis; labro reflexo quadricristato. Axis 2 millim.; diam. 5 millim. Inhabits Loo Choo. W. S.

LIOTIA FULGENS. T. parva, discoidea, aureo-margaritacea, laminâ calcareâ ochraceâ incrustata; anfr. 3+ citò crescentibus, ultimo ad peripheriam carinis binis acutis rufo-tessellatis cincto, interspatio concavo; subtus crateriformis. Apertura ampla circularis inferior; labro expanso, lobulato. Axis 2 millim.; diam. 5 millim.

Inhabits St. Simon's Bay, Cape of Good Hope. W. S. Very like *Delphinula bicarinata*, Ad. and Rv., which has a more elevated spire and unequal keels.

LIOTIA ASTERISCUS. T. minutissima, solida, alba, conica, costis elevatis acutis obliquis ad 20 sulco subsuturali sulco utroque ad peripheriam et sulco umbilicum ambiente aratis; anfr. 4 convexis. Apertura circularis; peristomate crasso duplici radiante; fauce margaritaceâ. Diam. 1.5 millim.; axis 1 millim. Inhabits Hong Kong. W. S. Very minute, but evidently adult and perfectly well characterized.

CYCLOSTREMA MODESTUM. T. parva, discoidea, solidula, lactea, supra convexiuscula, infra leniter concava, perforata; anfr. 4 sulcis volventibus clathratis cinctis quorum subsuturali majori. Apertura circularis; labro crenulato. Diam. 4 millim.; axis 2 millim. Inhabits Hong Kong. W. S.

Mr. C. J. Sprague presented the following:—

LIST OF PLANTS COLLECTED BY EMANUEL SAMUELS, IN SONOMA COUNTY, CALIFORNIA, IN 1856. BY ASA GRAY, M. D.

The plants named below were gathered by Mr. Samuels during a year's residence in California, and form part of the collections made under the auspices of the Boston Society of Natural History and the Smithsonian Institution at Washington. Mr. Samuels made collections in all the departments of Zoölogy and Botany, and the frequent rarities in his small but interesting collection bear testimony to his close observation and assiduity.

Although there are no undescribed species, several have been but recently discovered during the Pacific Railroad Exploring Expeditions, and are described in the Government Reports of those Expeditions.

1. Thalictrum dioicum, *L.* ?
2. Ranunculus Californicus, *Benth.*
3. " repens, *L. var.*
4. Aquilegia Canadensis, *L.*
5. Delphinium nudicaule, *Torr. & Gr.*
6. Delphinium azureum, *Mx.*
7. " patens, *Benth.*
8. " simplex, *Doug. var.* strictum.
9. Delphinium decorum, *Fisch. & Mey.*
10. Eschscholtzia Californica, *Cham.*
11. Platystemon Californicum, *Benth.*
12. Nasturtium lyratum, *Nutt.*
13. Turritis glabra, *L.*
14. Cardamine pauciseeta, *Benth.*
15. " tenuisecta, *Benth.*
16. Sisymbrium deflexum, *Harvey* ?
17. Tropidocarpum scabriusculum, *Hook.*
18. Erysimum asperum, *DC.*
18 *a.* Erysimum elatum, *Nutt.*
19. Lepidium nitidum, *Nutt.*
20. Viola pedunculata, *Torr. & Gr.*
21. " sarmentosa, *Doug.*
22. " adunca, *Sm.*
23. Silene Gallica, *L.*
24. Alsine Douglasii, *Fenzl.*
25. Sagina procumbens, *L.*
26. Calandrinia Menziesii, *Hook.*
27. Claytonia perfoliata, *Don.*
28. Lewisia rediviva, *Pursh.*
29. Sidalcea diploscypha, *Gray.*
30. " malvæflora, *Gray.*
31. " humilis, *Gray.*
32. Linum Californicum, *Benth.*
33. Geranium Carolinianum, *L.*
34. Erodium macrophyllum, *Hook. & Arn.*
35. Erodium cicutarium, *L'Her.*
36. Oxalis corniculata, *L.*
37. " stricta, *L.*
38. Limnanthes Douglasii, *R. Br.*
39. Rhus Californica, *Nutt.*
40. " diversiloba, *Torr. & Gr.*
41. Mesembryanthemum dimidiatum, *Harvey.*
42. Vicia exigua, *Nutt.*
43. " truncata, *Nutt.*
44. " gigantea, *Hook.*
45. Lathyrus venosus, *Muhl.*
46. " polymorphus, *Nutt.*
47. Psoralea physodes, *Dougl.*
48. " orbicularis, *Lindl.*
49. Trifolium albopurpureum, *Torr. & Gr.*
50. Trifolium ciliolatum, *Benth.*
51. " tridentatum, *Lindl.*
52. " variegatum, *Nutt.*
53. " fucatum, *Lindl.*
54. Hosackia bicolor, *Doug. & Benth. var.* gracilis.
55. Hosackia parviflora, *Benth.*
56. " subpinnata, *Torr. & Gr.*
57. " Purshiana, *Benth.*
58. " gracilis, *Benth.*
59. Lupinus nanus, *Dougl.*
60. " micranthus, *Dougl.*
61. " densiflorus, *Benth.*
62. " latifolius, *Agardh.*
63. " ?
64. Thermopsis fabacea, *DC. var.* tomentosa.
65. Nuttallia cerasiformis, *Torr. & Gr.*
66. Acæna trifida, *Ruiz & Pav.*
67. Potentilla anserina, *L.*
68. " glandulosa, *Lindl.*
69. Fragaria Chilensis, *Ehrh.*
70. Rubus vitifolius, *Cham. & Schlecht.*
71. Cratægus sanguinea, *Pallas. var.* Douglasii, *Torr. & Gr.*
72. Œnothera densiflora, *Sm.*
73. " dentata, *Cav.*
74. " ovata, *Nutt.*
75. " cheiranthifolia, *Hornem.*
76. " Lindleyi, *Dougl.*
77. " purpurea, *Curtis.*
78. " decumbens, *Dougl.*
79. Clarkia elegans, *Lindl.*
80. Megarrhiza Californica, *Torrey.*
81. Tillæa minima, *Miers.*
82. Lithophragma parviflora, *Nutt.*

83. Lithophragma heterophylla, *Hook. & Arn.*
84. Bowlesia lobata, *Ruiz & Pav.*
85. Eryngium articulatum, *Hook.*
86. Sanicula bipinnatifida, *Dougl.*
87. " Menziesii, *Hook. & Arn.*
88. " laciniata, *Hook. & Arn.*
89. " arctopoides, *Hook. & Arn.*
90. Edosmia Gairdneri, *Torr. & Gr.*
91. Pencedanum leiocarpum, *Nutt.*
92. " caruifolium, *Torr. & Gr.*
93. Pencedanum utriculatum, *Nutt.*
94. " macrocarpon, *Nutt.*
95. Daucus pusillus, *Mx. var.* scaber, *Torr. & Gr.*
96. Osmorrhiza nuda, *Torr.*
97. Lonicera involucrata, *Banks.*
98. " Californica, *Torr. & Gr.*
99. Symphoricarpus occidentalis, *Br.*
100. Symphoricarpus ciliatus, *Nutt.*
101. Sambucus glauca, *Nutt.*
102. Galium Aparine, *L.*
103. " Californicum, *Hook. & Arn.*
104. Plectritis congesta, *Lindl.*
105. Erigeron Canadense, *L.*
106. " Douglasii, *Torr. & Gr.*
107. Solidago Californica, *Nutt.*
108. Grindelia hirsutula, *Hook. & Arn.*
109. Stylocline gnaphalioides, *Nutt.*
110. Psilocarphus tenellus, *Nutt.*
111. Blennosperma Californicum, *Fisch. & Mey.*
112. Wyethia angustifolia, *Nutt.*
113. Monolopia major, *DC.*
114. Burrielia chrysostoma, *Torr. & Gr.*
115. Burrielia gracilis, *DC.*
116. " uliginosa, *Gray.*
117. Helenium puberulum, *DC.*
118. Achyrachæna mollis, *Schauer.*
119. Layia (Callichroa) platyglossa, *Gray.*
120. Layia (Calliglossa) Douglasii, *Gray.*
121. Hemizonia congesta, *DC.*
122. Madia racemosa, *Nutt.*
123. " sativa, *Molina.*
124. Achillea Millefolium, *L.*
125. Matricaria discoidea, *DC.*
126. Chrysanthemum (introduced).
127. Artemisia Ludoviciana, *Nutt.* vel vulgaris, *var.*
128. Gnaphalium Californicum, *DC.*
129. " purpureum, *L.*
130. " luteo-album, *L.*
131. Senecio aronicoides, *DC.*
132. Echinais carlinoides, *Cass. var.* nutans (introduced).
133. Cirsium Californicum, *Gray.*
134. Calais Bigelovii, *Gray.*
135. " sylvatica, *Benth.*
136. Macrorhynchus retrorsus, *Benth.*
137. " heterophyllus, *Nutt.*
138. Sonchus oleraceus, *L.*
139. " asper, *Vill.*
140. Downingia elegans, *Torr.*
141. Githopsis calycina, *Benth. var.* hirsuta, *Nutt.*
142. Plantago maritima, *L.*
142 *a*. Plantago Patagonica, *var.* gnaphalioides.
143. Armeria vulgaris, *Willd. var.* Californica.
144. Dodecatheon Meadia, *L.*
145. Linaria Canadensis, *Dum.*
146. Scrophularia nodosa, *L.*
147. Collinsia bartsiæfolia, *Benth.*
148. " bicolor, *Benth.*
149. Mimulus (Diplacus) glutinosus, *Nutt.*
150. Mimulus luteus, *L.*
151. Eunanus Douglasii, *Benth.*
152. Veronica Anagallis, *L.*
153. " peregrina, *L.*
154. Castilleia hispida, *Benth.*
155. " Douglasii ?
156. Orthocarpus densiflorus, *Benth.*
157. " castilleioides, *Benth.*
158. " faucibarbatus, *Gray.*
159. " purpurascens, *Benth.*
160. Pedicularis attenuata, *Benth.*
161. Verbena prostrata, *R. Br.*
162. Monarda villosa, *var.* leptosiphon, *Torr.* (M. Sheltoni, *Torr.*)
163. Pogogyne Douglasii, *Benth.*
164. " multiflora, *Benth.*
165. Brunella vulgaris, *L.*
166. Salvia Columbariæ, *Benth.*
167. Scutellaria tuberosa, *Benth.*
168. " pycnantha, *Benth.*

169. Amsinckia spectabilis, *Fisch. & Mey.*
170. Eritrichium fulvum, *A. DC.?*
171. " Chorisianum, *DC.?*
172. " sp.
173. Cynoglossum grande, *Dougl.*
174. Nemophila parviflora, *Benth.*
175. " atomaria, *Fisch. & Mey.*
176. " insignis, *Benth.*
177. Phacelia tanacetifolia, *Benth. var.* tenuifolia, *Thurber.*
178. Phacelia circinata, *Jacquin.*
179. Eutoca divaricata, *Benth.*
180. Collomia gracilis, *Benth.*
181. Navarretia cotulæfolia, *Hook. & Arn.*
182. Navarretia leucocephala, *Benth.*
183. " squarrosa, *Hook. & Arn. var.*
184. Gilia achilleæfolia, *Benth.*
185. " multicaulis, *Benth.*
186. " androsacea, *Steud.*
187. " (leptosiphon), sp.
188. " sp.
189. Erythræa Muhlenbergii, *Griseb.*
190. Convolvulus Californicus, *Choisy.*
191. Solanum umbelliferum, *Eschsch.*
192. Chenopodium anthelminticum, *Linn.*
193. Eriogonum elongatum, *Benth.*
194. Chorizanthe pungens, *Benth.*
195. " Douglasii, *Benth.*
196. " sp.
197. Euphorbia dictyosperma, *Fisch. & Mey.*
198. Alisma Plantago, *L.*
199. Luzula campestris, *DC.*
200. Juncus bulbosus, *Pursh.*
201. " bufonius, *L.*
202. Sisyrinchium Bermudiana, *L.*
203. Iris macrosiphon, *Torr.*
204. Anticlea Fremontii, *Torr.*
205. Scoliopus Bigelovii, *Torr.*
206. Fritillaria lanceolata, *var.* floribunda, *Benth.*
207. Calochortus luteus, *Dougl.*
208. Allium acuminatum, *Hook.*
209. Brodiæa grandiflora, *Sm.*
210. " capitata, *Benth.*
211. " multiflora, *Benth.*
212. " congesta.
213. Seubertia laxa, *Kunth.*
214. Calliprora lutea, *Lindl.*
215. Cyclobothra elegans, *Lindl.*
216. Trillium ovatum, *Pursh.*
217. Carex, sp.
218. Scirpus lacustris, *L.*
219. Agrostis, sp.
220. Aira danthonioides, *Trin.*
221. Melica imperfecta, *Trin.*
222. Bromus carinatus, *Hook. & Arn.*
223. Elymus Canadensis, *L. var.*
224. Hordeum pratense, *Hudson.*
225. Sitanion elymoides, *Raf.*
226. Phalaris Californica, *Hook. & Arn.*
227. Kœleria cristata, *Pers.*
228. Polypodium intermedium, *Hook. & Arn.*
229. Adiantum Capillus-Veneris, *L.*
230. " Chilense, *Kaulf.*
231. Pteris aquilina, *L.*
232. Gymnogramma triangulare, *Kaulf.*
233. Aspidium argutum, *Kaulf.*
234. Funaria hygrometrica, *Hedwig.*
235. Ramalina Menziesii, *Taylor.*
236. Chorda filum.
237. Ceramium rubrum.
238. Rhodomenia laciniata.

List of a Collection of dried Plants made by L. J. Xantus, at Fort Tejon, and Vicinity, California, near Lat. 35°, and Long. 119,° 1857–8. By Asa Gray, M. D.

1. Clematis ligusticifolia, *Nutt.*
2. Delphinium Menziesii, *DC.*
3. Eschscholtzia Californica, *Cham.*
4. Eschscholtzia tenuifolia, *Benth.*
5. Dicentra (Chrysocapnos, *Torr.*) chrysantha, *H. & A.*
6. Meconopsis heterophylla, *Benth.*
7. Streptanthus heterophyllus, *Nutt.*

8. Erysimum asperum, *DC. var.* (elatum, *Nutt.*)
9. Raphanus sativus, *Linn.* "In cañons, &c."
10. Isomeris arborea, *Nutt.*
11. Viola pedunculata, *var.* petalis 2 superioribus extus præsertim fusco-purpureis.
12. Silene Californica, *Durand*, (*var.* of S. laciniata.)
13. Calandrinia Menziesii, *Hook.*
14. Claytonia perfoliata, *Don.*
15. Sidalcea malvæflora, *Gray.*
16. Fremontia Californica, *Torr.*
17. Erodium cicutarium, *L'Her.*
18. Frangula Californica, *Gray.*
19. Rhus diversiloba, *Torr. & Gr.*
20. Æsculus Californica, *Nutt.*
21. Lupinus microcarpus, *Sims.*
22. " bicolor, *Lindl.*
23. " leptophyllus, *Benth. var.* foliolis latioribus.
24. Hosackia Purshiana, *Benth.*
25. " scoparia, *Nutt.*
26. Cercocarpus parvifolius, *Nutt.*
27. Œnothera biennis, *L. var.*
28. " bistorta, *Nutt.?*
29. " tenella, *Cav.*
29 *a*. " rubicunda, *Lindl.*
30. Clarkia elegans, *Lindl.*

31. CLARKIA XANTIANA (sp. nov.): foliis linearibus seu lanceolatis; floribus quasi racemosis; calycis tubo ore villosissimo; petalis cuneatis altè bilobis cum lancinulâ subulatâ interpositâ deorsum in unguiculam latam edentatam sensim angustatis; staminibus 8 fertilibus; stigmatis lobis latè ovalibus brevibus; capsulâ sessili.—An interesting species from its holding an intermediate position between the original *Clarkia pulchella* and *C.* (*Phœostoma*, Spach.) *elegans*; the foliage (which, with the ovaries and flower-buds, is minutely cinereous-puberulent) resembling the former, as do the lobed petals, but here the middle lobe is reduced to a mere lacinula, and the broader and shorter claw is toothless; while the blossoms are racemosely disposed along the simple stem or branches as in *C. elegans*, in bud strongly drooping. There are no scales at the base of the filaments; but the throat of the short funnel-form tube of the calyx is evenly and densely bearded with villous hairs. Petals purple or pink, often with a deeper-colored spot toward the base of the blade. Capsules rather slender, sessile, or the lowest subsessile.

32. Zauschneria Californica, *Presl.*
33. Epilobium coloratum, *Muhl.*
34. Mentzelia albicaulis, *Dougl.*
35. Megarrhiza Californica, *Torr.*
36. Cicuta maculata, *L.*
37. Berula angustifolia, *Koch.*
38. Edosmia Gairdneri, *Nutt.*
39. Peucedanum utriculatum, *Nutt.*
40. Galium boreale, *L. var.*
41. Erigeron Douglasii, *Torr. & Gray.*
42. Balsamorhiza deltoidea, *Nutt.*
43. Leptosyne Douglasii, *DC.*
44. Helianthus lenticularis, *Dougl.*
45. Chœnactis glabriuscula, *DC. var.* megacephala, *Gray, in Pl. Whippl.*
46. Burrielia gracilis, *DC.*
47. Bahia confertiflora, *DC.*
48. " Wallacei, *Gray, in Pl. Whippl.*
49. Monolopia major, *DC.*
50. Layia gaillardioides, *Hook. & Arn. var.* pappo albo; foliis pinnatifidis.

51. Madaria corymbosa, *DC.*
52. Achillea Millefolium, *L.*
53. Senecio Douglasii, *DC.*
54. Sonchus asper, *Vill.*
55. Calais linearifolia, *DC.*
56. Macrorhynchus grandiflorus, *Nutt.*
57. Arctostaphylos glauca, *Lindl.*
58. Collinsia bicolor, *Benth.*
59. " " *var.* parviflora.
60. Scrophularia nodosa, *L.*
61. Pentstemon centranthifolius, *Benth.* fol. latioribus.

62. PENTSTEMON BREVIFLORUS, *Lindl. var.* Shrubby; lower leaves short (half an inch or less in length,) oblong or somewhat obovate, very obtuse; sepals glandularvillous (as they are, less conspicuously, in Douglas's specimens); corolla strongly bearded, especially at the summit of the lobes, with long and glandular hairs. The expression "labio superiore villoso" does not adequately express it.

63. PENTSTEMON TERNATUS (*Torr. in Mex. Bound. Surv.*) glaber, basi fruticosus; caulibus floridis ramisve virgatis simplicissimis glaucis; foliis ternato-verticillatis lineari-lanceolatis (pollicaribus) utrinque acutis subsessilibus rigidis cartilagineo-serratis denticulatisve, floralibus subulatis; paniculâ angustatâ; calyce (segmentis lanceolato-ovatis) pedicellisque glanduloso-puberis; corollâ (purpureâ? extus pruinoso-puberulâ) longè cylindricâ, limbo brevi, labiis æquilongis, superiore oblongo erecto apice bifido, inferiore tripartito, segmentis patentibus angustè oblongis; filamento sterili corollâ dimidio breviore hinc valdè barbato.—Stems or simple branches slender, one or two feet long, leafy to the inflorescence, the leaves about the length of the internodes. Flowers in a virgate panicle. Tube of the corolla an inch long, only two lines in diameter, scarcely ampliate at the summit, the lobes and upper lip only three lines long. Fertile filaments glabrous except at their base, where they are sparsely hirsute; anthers scarcely exserted, glabrous; sterile filament very strongly bearded on the posterior side for its whole length. A very distinct species of Bentham's section *Elmigera;* the leaves in threes in all the specimens.

64. PENTSTEMON LÆTUS (sp. nov.): pallidus, puberulus, supernè glandulosus; caulibus subpedalibus adscendentibus; foliis integerrimis crassiusculis, inferioribus spatulatis seu oblanceolatis in petiolum marginatum attenuatis, superioribus oblongo-lanceolatis basi latâ arctè sessilibus, floralibus parvis; paniculâ laxâ; pedunculis sæpius trifloris; calycis segmentis oblongis herbaceis immarginatis; corollâ cœruleâ supernè campanulato-

ampliatâ, lobis rotundatis subæqualibus; antheris (§ Saccantheræ) rimâ hispido-ciliatis juxta insertionem villosulis; filamento sterili glaberrimo apice dilatato.—A depauperate specimen of this is what, in the account of Lieut. Beckwith's collection, (Pacific Railroad Explorations, 2, p. 122,) I doubtfully referred to *P. heterophyllus*. It proves to be a very distinct species of the same section, and a handsome one, the (apparently bright blue) corolla over an inch in length.

65. Mimulus cardinalis, *Dougl.*
66. " luteus, *Linn.*
67. Eunanus Fremonti, Benth. *var.*
68. Castilleia affinis, *Hook. & Arn.*
69. " hispida, *Hook. & Arn.*
70. " candens, *Durand & Hilgard, in Pacif. R. R. Expl.* 5, pp. 12, 18?
71. Castilleia linariæfolia, *Benth.* (Folia floralia sæpius trifida; calyx posticè etiam bifidus; corolla nunc bipollicaris.)
72. Orthocarpus purpurascens, *Benth.*
73. Solanum umbelliferum, *Eschsch.*
74. Datura meteloides, *DC.*
75. Nicotiana, n. sp.? N. plumbaginifolia, *var.?* Bigelovii, *Torr. in Pacif. R. R. Expl.* 4, p. 127.
76. Mentha Canadensis, *Linn.*
77. Monardella candicans, *Benth.*
78. Salvia Columbariæ, *Benth.*
79. " carduacea, *Benth.*
80. Stachys pycnantha, *Benth. & var.* foliis albo-tomentosis.
81. Amsinckia spectabilis, *Fisch. & Meyer.*
82. Amsinckia spectabilis, *var.* minor.
83. Eritrichium fulvum, *A. DC.*
84. Krynitzia leiocarpa, *Fisch. & Meyer.*
85. Eritrichium angustifolium, *Torr. in Pacif. R. R.* 5, p. 363.
86. Eritrichium, n. sp.? too young to characterize.
87. Nemophila insignis, *Dougl.*
88. Ellisia membranacea, *Benth.*
89. Phacelia circinata, *Jacq.*
90. " tanacetifolia, *Benth.*
91. " " *var.* tenuifolia, *Thurber.*
92. Phacelia ramosissima, *Benth.* forma evoluta.
93. Emmenanthe pendulifiora, *Benth.*
94. Eriodyction tomentosum, *Benth.*
95. Gilia densifolia; etiam G. elongata. *Benth.*
96. Gilia achilleæfolia, *Benth.*
97. " tricolor, *Benth.*
98. " (Linanthus) dichotoma, *Benth.*
99. Gilia (Leptosiphon) androsacea, *Benth.*
100. Apocynum cannabinum, *Linn.*
101. Acerates (Anantherix) tomentosa, *Torr. Mex. Bound. Surv.*
102. Asclepias fascicularis, *Decaisne.*
103. Mirabilis (Quamoclidion) multiflora, *Torr.*
104. Blitum Bonus-Henricus, *Moq. var.* (Chenopodium anthelminticum, *var.?* hastatum, *Moquin.*)
105. Eriogonum polifolium, *Benth.*
106. " angulosum, *Benth.*
107. Chorizanthe procumbens, *Nutt.* (An C. staticoides, *var.?*)

108. CHORIZANTHE (MUCRONEA) PERFOLIATA (sp. nov.): glabella; foliis chartaceis, caulinis triangulatis trilobisve sæpissimè perfoliatis; involucro tetraquetro quadridentato, dentibus subæqualibus subulato-aristulatis; perigonii segmentis exterioribus 2–4–dentatis leviter erosis, interioribus magis laciniato-fim-

briatis.—Repeatedly dichotomous from the annual root, divaricate-diffuse, a sessile and solitary involucrum in each fork; on the branchlets the involucres rather crowded and somewhat spicate or panicled, through the less forking and the gradual reduction of the leaves to bracts. Radical leaves spatulate. The cauline leaves are larger, less lobed, more amplexicaul, (and most of them really perfoliate,) and the angles or lobes less awn-pointed than in *C.* (*Mucronea*, Benth.) *Californica;* the four triangular teeth of the involucre also tipped with a shorter awn, not exceeding the perigonium when that is fully developed; the divisions of the latter, especially the three inner ones, conspicuously fimbriate-laciniate. Otherwise this plant closely resembles Bentham's *Mucronea Californica*, and confirms his doubts of the distinctness of the genus from *Chorizanthe*, notwithstanding the peculiarity of habit. *Centrostegia*, with a similar habit, is distinguishable only by the spurred appendages of the involucrum, and is probably to be reduced, along with *Mucronea*, to a section of *Chorizanthe*. To this, however, does not belong Remy's *C. commissuralis*, which differs from true *Chorizanthe* merely in the laxer inflorescence. *Acanthogonum*, Torr. (which has a short-pedicelled flower and nine stamens,) is an interesting link, plainly connecting *Lastarriæa*, Remy, with the other Eriogoneous genera. The verticillate upper leaves of the latter answer to the involucre, which, however, incloses a proliferous shoot as well as a flower.

109. Anemonopsis Californica, *Nutt.*
110. Euphorbia albomarginata, *Torr.* (E. stipulacea, *Engelm.*)
111. Quercus lobata, *Née*, (Q. Hindsii, *Benth.*) Foliage only.
112. Ephedra antisyphilitica, *Berl.*
113. Epipactis Americana, *Lindl.*
114. Brodiæa capitata, *Benth.*
115. Calliprora lutea, *Lindl.*
116. Tritelia laxa, *Lindl.*
117. Calochortus venustus, *Benth.*
118. Juncus xiphioides, *E. Meyer.*
119. Polypogon Monspeliensis, *Linn.*
120. Triticum repens, *Linn.*
121. Elymus dasystachys, *Trin. ex Munro in Pl. Hartw.*, p. 342, (= forma luxurians, *Hartw.* No. 2032.)
122. Allosorus andromedæfolius, *Kaulf.*

Dr. C. T. Jackson announced that the wax-plant of Japan (*Rhus succedaneum*) had been made to vegetate at the forcing houses in Washington; it grows there vigorously, and will doubtless prove suitable for the Southern States generally. He also stated that the experiment

of the introduction of the tea-plant bids fair to be successful in the United States.

An engraving of Linnæus, at the age of twenty-five, in his Lapland costume, was presented in the name of Mr. William Sharswood, of Philadelphia. It was executed in Berlin, from a photograph taken from an oil painting in the Library of the Zoölogical Society at Amsterdam. It represents the young naturalist holding in his hand the plant *Linnæa borealis*, and with his girdle ornamented with various botanical and entomological implements.

September 7, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. T. J. Whittemore read some notes taken at Mohawk, Herkimer Co., N. Y., in August, 1859.

Mohawk is situated on the delta of what was probably a considerable stream, at an early period, flowing into the Mohawk valley, and may have been a lake or estuary; Fulmer's creek, on which it is situated, is now a small mountain stream. Dr. Lewis, in Vol. 6 of the Proceedings, gives 87 species of 17 genera of shells found in this region, embracing Little Lakes, and Schuyler's Lake; 18 species have since been added.

"Little Lakes," in Warren township, are 800 feet above the river, the area of which formerly extended over much which is now swamp, underlaid with soil of the same character as the bottom of the lakes. The upper of the two lakes is about three quarters of a mile long, and its whole bottom is of marl, and filled with living and dead shells, many of which are fossil. This marl is 14 feet deep, by examination; the lake is shallow, and furnishes fine pickerel and other fish, and numerous shells,—the lower lake contains more of a black muck bottom; the shells, fishes, and reptiles are the same in both lakes, but the shells grow

larger in the upper, and the reptiles are more numerous in the lower. At Schuyler's Lake the reptiles, fishes, and shells are the same as in the former, with the addition of an *alasmodon*, *anodon*, *unio*, and *lymnea;* the last, *L. gracilis*, is found on the bulrushes, flags, and lily pads, from one to two feet from the water; the specimens were about half grown, being perfect about the middle of October.

Dr. C. T. Jackson alluded to the occurrence of white marl in the bottom of a pond in New Hampshire, the water flowing into which from a peat bog is highly charged with crenate of lime; this he thought the source of the marl, and perhaps, by decomposition, of the carbonate of lime in the living shells.

Dr. Hayes alluded to the above action of peat waters on lime as exceedingly interesting; it may be noticed wherever dark waters are changed into green-colored. In waters highly charged with crenate and humate of ammonia, there is found a great increase in the numbers of shells. Crenic acid is an important world-builder and world-destroyer; it is found in all sea-water, especially in that from great depths, combined with lime. Carbonate of manganese is attacked by crenic acid, and waters containing this acid, flowing over manganese rocks, always become darker.

Mr. Putnam presented, in the name of Prof. Agassiz, 30 species of fishes from the Sandwich Islands, all new to the cabinet, and about one half of them undescribed.

Dr. Kneeland presented a paraffine candle made from the cannel coal of Boone Co., Kentucky, a specimen of which was presented by Mr. J. W. Richardson some months ago.

Dr. Hayes observed that this coal deserves rather the name of a compound rock, being full of minute spangles of mica interspersed with the vegetable matter of the coal; on this account it leaves more ash. This structure indicates that the coal was

deposited during a period of extreme quiet, the humus being carried slowly along with the mica scales. It yields paraffine in the first stage of distillation, being an educt, not a product, actually existing as a wax and capable of being traced back to wax-bearing plants; by distilling the coal, we get back the wax. These candles are made at New Bedford, by a patent process, and are far superior to those of foreign manufacture, inasmuch as there is no admixture of other matters, and a fine and regular crystallization is obtained by alternations of sudden and gradual cooling. From this coal is also obtained a thin, light, kerosene oil of superior quality, — a fluid paraffine. It is worthy of note that from this coal we obtain the aerial burning gas, the solid paraffine, and the fluid kerosene, — the three forms of illuminating materials.

Dr. C. T. Jackson stated that a locality containing tin ore had been discovered at Los Angelos, California, within the limits of the United States; the quantity of ore is very large, and it yields 60½ per cent. of oxide of tin, with brown oxide of iron.

Dr. Jackson also alluded to the quantity of saccharine matter in our native grapes; he had recently experimented with one, the Henshaw grape from Virginia, which he had found to contain 15½ per cent. of grape sugar; it will probably make a good claret wine.

Dr. J. Mason Warren presented an engraving of his father, Dr. John C. Warren, President of the Society from 1847 to 1856.

Mr. Chamberlain exhibited a living embryo skate within the egg-case.

The Corresponding Secretary read the following letters, viz :—

From Richard Hill, Jamaica, March 1, 1859, accepting membership, and presenting Mr. Gosse's two volumes on the Natural History of Jamaica; Académie des Sciences, Arts, et Belles-Lettres de Dijon; Académie Imperiale des Sciences de Russie,

St. Petersburg, June 16, 1859; Imperial Mineralogical Society, St. Petersburg, October 10, 1858, acknowledging the receipt of the publications of the Society; Verein für vaterländische Naturkunde in Württemberg, Stuttgart, December 5, 1858; Société de Physique et d'Histoire Naturelle de Genève, November 20, 1858, acknowledging the same, and presenting their own publications; K. Akademie der Wissenschaften, Wien, January 22, 1859; Oberhessischer Gesellschaft für Natur-und-Heilkunde, Giessen, March 30, 1859, presenting their publications; Société de Geographie, Paris, July 31, 1856, acknowledging the receipt of the Society's publications, and asking for previous numbers; H. Davis, July 9 and August 8, concerning collection of specimens, &c.

Messrs. William Sharswood of Philadelphia, and Arthur M. Edwards of New York, were elected Corresponding Members.

September 21, 1859.

T. J. Whittemore, Esq., in the Chair.

A letter from Mr. William Edwards, of South Natick, Mass., to the President, on the phenomena of vibrating dams, was read, by vote of the Society.

His observations and experiments had been made during nearly every day for fourteen months, ending with February last, upon the waterfall in that village. The phenomena there observed are not confined to the vertical sheet, but may be traced in any rapid stream of water, in the bed of which an obstruction is placed; the waves or nodes below such an obstruction are identical with those of a vertical sheet obstructed by a dam. The nodes describe the form of the surface, and never move from their place except by an increase or decrease of the amount of water above the obstruction; by sinking this last the distance between the nodes is increased, by raising it they become more fre-

quent. If we excite a wave above that will float over an increased amount of water, the nodes will move down till the wave has passed away, when they suddenly come back into place. When we cause these waves to follow in rapid succession, we have, in the descent and return of the nodes, a perfect miniature of the vibrating sheet,—the same effect is often produced by the friction of the water over the obstruction.

The letter was acompanied by sketches representing the nodes from an obstruction in the bed of the stream, and from a dam,—the latter in the vertical sheet, across which they extended, being 3 and 5, the number being governed by the depth of the water at the dam.

To produce a vibrating sheet, these nodes must first be set in motion, which is done by the waves caused by the friction of the water on the dam. If we count these waves as they pass the edge of the dam, and the vibrations of buildings in the vicinity, they are found always to correspond. With 10 inches of water flowing over the dam, we have 3 nodes on the sheet, and 280 vibrations per minute; with 8 inches, 4 nodes and 300 vibrations; with 7 inches, 5 nodes and 335 vibrations; with 5 inches, 8 nodes and over 400 vibrations.

The appearance of a vibrating sheet is very changeable under different reflections of light. At one time the downward motion is alone visible, giving the impression that the nodes are constantly forming and falling; a few hours after, the upward motion only is seen, indicating that the agitation of the sheet proceeds from the bottom; at other times the descent and return of the nodes are alike visible.

The vibrations of buildings near the dam often cease by a want of synchronous action of the whole sheet, or by heavy waves from above the dam. After the freshet in June, 1858, the water was of a dark greenish yellow color, and deposited a thick coating of slimy matter upon the edge of the dam, which prevented any friction; consequently all vibrations ceased for several weeks, notwithstanding the water passed the most favorable points for producing them.

A series of long-continued and careful experiments has convinced him that the sheet is of the concavo-convex form. This may be demonstrated by viewing the sheet from both sides, or by

detaching a portion of it. If a strip of cambric be attached to the obstruction, it assumes the form of the upper surface, showing the concavity of the lower directly opposite to the convexity of the upper surface.

On account of flush-boards on the dam, it has been necessary to suspend for a time a series of experiments for determining the manner in which buildings are affected by the vibrating sheet.

Mr. Edward S. Rand, Jr., presented, through Mr. Sprague, an account of his experiments with the Japan wax-plant (*Rhus succedaneum*).

A few seeds of this plant, received by his father, were sown in the usual soil for seeds (peat, leaf mould, and silver sand,) and placed on a sunny shelf in the greenhouse, where they were well watered; they were very slow in germinating, but at length came up plentifully; after some weeks they were potted off in small pots, and have since grown quite vigorously. They are now from two to six inches high; the leaf is very different from that of any of the family with which he is acquainted, resembling more that of some of the new spireas; as far as can be judged, the plant will be one of great symmetry and beauty; he hopes by care to fruit it, and will then report further to the Society.

In relation to orchids or air-plants, of which he has a fine collection, he said that he had tried to preserve their magnificent flowers in spirit, with the intention of making an extensive collection; but in a few days or weeks the colors fade, or even disappear, leaving nothing of beauty except the form of the flower. He presented a flower of *Acanthophippium bicolor*, in which the fresh colors are black, white, and yellow, changed to a uniform white in spirit. He offered to preserve a large number of species, if any liquid could be found which would not destroy the colors.

Mr. F. H. Storer remarked that a solution of glycerine and water will preserve the colors of fishes, and he believed would be equally efficacious in the case of plants.

Mr. Sprague presented three specimens of the short or trout-nosed pickerel, varying in length from 12 to 20

inches, taken in Charles River, in the town of Wayland; this species, called in some localities the mud pickerel, is found in muddy-bottomed streams, especially where they empty into rivers, and is rarèr than the long or shovel-nosed species.

Mr. Putnam observed that the large size of these fishes proves that the *Esox fasciatus* (Dekay) is not the young of *Esox reticulatus* (Lesueur); the latter is most frequently found in ponds.

Dr. A. Snowden Piggott, of Baltimore, was elected a Corresponding Member of the Society; and Mr. John Homans, Jr., of Boston, Resident Member.

DONATIONS TO THE MUSEUM.

July 6, 1859. Thirty species of crustacea, from the Bahama Islands; by Dr. Henry Bryant. Twenty-four slides of microscopic objects; by E. Samuels. Male, female, nest, and four eggs of *Ammodromus Henslowi*, Aud., from Berlin, Mass.; by Mr. E. S. Wheeler. A star-nosed mole, from Roxbury; by Mr. J. Champney. A sand-hill crane, *Grus Canadensis;* raven, *Corvus carnivorus;* three-toed woodpecker, *Picoides arcticus;* pine grosbeak, *Pinicola Canadensis*, male and female; four crossbills, *Curvirostra Americana*, two males and two females; a golden-winged woodpecker, *Colaptes auratus*, and longspur, *Plectrophanes lapponicus;* from Portage Lake, Lake Superior; by Dr. S. Kneeland, Jr. Two skulls of the loggerhead turtle, from the Bahamas; by Dr. Henry Bryant.

July 20, 1859. Fishes, an ascidian, and a crab, from the Sandwich Islands; by Dr. C. F. Winslow. A star-fish, *euryale*, from Boston harbor; by Mr. Kilby Page.

September 7, 1859. Fishes, reptiles, insects, shells, and minerals, from Mohawk, N. Y.; by Dr. James Lewis and Mr. T. J. Whittemore. Twenty-one species of crustacea, from the Sandwich Islands; by Prof. Agassiz. Crustacea, from Cape Cod; by Mr. Albert Ordway. Twenty-three species of land shells, from the vicinity of Bombay; by Dr. Simeon Shurtleff. Thirty species of fishes, from the Sandwich Islands; by Prof. Agassiz. A male *Corydalis cornutus*, from Roxbury; by Louis Lehmann. A caterpillar of a sphinx moth, covered with pupa cases of ichneumon fly, from Jamaica Plain; and a paraffine candle; by Dr. S. Kneeland, Jr. Male and female yellow-shouldered sparrow, *Coturniculus passerinus*, with egg; and two caterpillars; from Berlin, Mass.; by Mr. E. S. Wheeler.

September 21, 1859. Specimens of short-nosed pickerel from Wayland, Mass.; by Mr. C. J. Sprague. A white-tailed remora, *Echeneis albicauda*, from Holmes's Hole; by Mr. J. S. Fay. Fishes, reptiles, insects, and crawfishes, from Kansas; by Dr. Thos. H. Webb. A humming-bird, *Trochilus colubris*, killed by the

frost; by Dr. T. M. Brewer. Young *Cottus Virginianus* from Cohasset; by Dr. S. Kneeland, Jr. Pomocentroid fishes from Zanzibar; by Prof. Agassiz. A phalarope, *Phalaropus hyperboreus*, and solitary tattler, *Rhyacophilus solitarius* from Cohasset; by Mr. P. S. Tyler.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPT. 30, 1859.

Seventh Supplement to Dana's Mineralogy. By the Author. 8vo. Pamph. pp. 119–144. *From the Author.*

A Chapter on Fossil Lightning. By George D. Gibb, M. D., &c. 8vo. Pamph. London, 1859. *From the Author.*

Index to the Catalogue of a portion of the Public Library of the City of Boston. 8vo. 1858. *From the Trustees of the Public Library.*

On the Distribution of the Forests and Trees of North America, &c. By J. G. Cooper, M. D. 8vo. Pamph. *From the Author.*

The Naturalist in Bermuda. By J. M. Jones. 12mo. London, 1859. *From the Author.*

Comets; their Constitution and Phases. 8vo. Pamph. By C. Kemplay. London, 1859. *From the Author.*

A Naturalist's Sojourn in Jamaica. By P. H. Gosse. 12mo. London, 1851.

Birds of Jamaica. By P. H. Gosse. 12mo. London, 1847. *From Hon. Richard Hill.*

Bibliographia Librorum Entomologicorum in Americâ boreali editorum. Auct. Guil. Sharswood. 8vo. Pamph.

Catalogus Coleopterorum Europæ. 8vo. Pamph. Stettin, 1858. *From William Sharswood.*

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 13 and 14. 1859.

Memoirs of the American Academy of Arts and Sciences. Vol. VI. No. 2. 4to. Boston, 1859.

Proceedings of the same. Vol. IV. pp. 89–248. 8vo. Boston, 1859.

Canadian Journal of Industry, Science, and Art. No. 21, for May, and No. 22, for July, 1859.

New York Journal of Medicine. Nos. 97 and 98. 1859.

Proceedings of the Zoölogical Society of London. With Illustrations. Part XXVI. 8vo. 1858.

Thesaurus Conchyliorum. By G. B. Sowerby. Part XIX.

Canadian Naturalist and Geologist. Vol. IV. No. 4, for August, 1859. Montreal.

Journal of the Elliott Society of Natural History. Vol. I. Articles 1 and 2. 4to. Charleston, S. C.

Journal of the Royal Dublin Society. No. 14, for July, 1859.

Silliman's American Journal of Science and Arts. No. 82, for July, and No. 83, for Sept. 1859. New Haven.

Bulletin de la Société Paleontologique de Belgique. I. Feuilles 1–4. 8vo. Anvers, 1859.

Annual Report of the Trustees of the New York State Library. 8vo. Pamph. Albany, 1859.

Proceedings on Laying the Corner Stone of the Free Public Library in New Bedford. 8vo. New Bedford, 1856.

Kaiserliche Akad. der Wissenschaften. Sitzungsberichte Math-naturw. classe. Nos. 1–26. Kreil's Anhang. 8vo. Denkschriften Math-naturw. Band XIV. XV. 4to. Wien.

Almanach, 1858. 12mo. Wien.

Jahrbücher der Centralanstalt für Meteorologie. Band V. 4to. Wien.

Festrede bei der Feierlichen Übernahme, &c. Dr. T. G. Von Karajan. 8vo. Pamph. Wien.

Die Principien der Heutigen Physik. Dr. A. Ritter v. Ettingshausen. 8vo. Wien.

Genera of Recent Mollusca. No. 4. 8vo. London.

Mémoires de l'Académie Imperiale des Sciences, &c., de Dijon. 2ième Serie. Tome VI. Année 1857.

Proceedings of the Royal Geographical Society. Vol. 3. Nos. 1, 2, and 3. 8vo. London, 1859.

Siebenter Bericht der Oberhessischen Gesellschaft für Natur-und Heilkunde. 8vo. Pamph. Giessen, 1859.

Württembergische Naturwissenchaftliche Jahreshefte. 1, 2, 1859. 8vo. Pamph. Stuttgart.

Jahrbuch der K.-K. Geologischen Reichsanstalt. IX. Nos. 1, 2, 3. 1858. 8vo. Wien.

Archiv für Naturgeschichte. Gegründet von A. F. A. Wiegmann. Fortgesetzt von W. F. Erichson. Vol. 24. Nos. 3, 4. 8vo. 1858. Berlin.

Mémoires de la Société de Physique et d'Histoire Naturelle de Genève. 4to. Tome XIV. 2de partie. Genève, 1858.

Leeds Philosophical and Literary Society. Annual Report. 8vo. Pamph. 1857–8.

Report of the Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire. 8vo. Pamph. Leeds, 1857–8.

Gelehrte Antzeigen. 45, 46. 4to. München, 1857–8.

Nachrichten von der Georg-Augusts-Universitat. 12mo. Pamph. Göttingen, 1858.

Monatsbericht der K. Preussischen Akademie der Wissenschaften zu Berlin. July to Dec. 1858. 8vo. Berlin.

Proceedings of the American Philosophical Society. Vol. VII. No. 61. January–June, 1859.

Memoirs of the Geological Survey of India. Vol. I. Part 2. 8vo. Calcutta, 1858.

Flore Illustrée de Mucedinées d'Europe. Par A. C. J. Corda. Folio. *Received in Exchange.*

Report on Crustacea. By J. D. Dana. U. S. Exploring Expedition. 8 vols. 8vo. and 1 fol. Plates.

Owen, Richard; On the Classification and Geographical Distribution of the Mammalia. 8vo. London, 1859.

Annals and Magazine of Natural History. Nos. 17, 19, 20, and 21. London, 1859. *From the Curtis Fund.*

Popular Geology. By Hugh Miller. With a Resumé of the Progress of Geological Science, by Mrs. Miller. 12mo. Boston, 1859.

Curiosities of Natural History. By F. T. Buckland. 8vo. New York, 1859.

Country Life: a Handbook of Agriculture, Horticulture, and Landscape Gardening. By R. Morris Copeland. 8vo. Boston, 1859.

Life of Jonathan Trumbull, Sen. By J. W. Stuart. 8vo. Boston, 1859.

Irving's Life of Washington. Vol. V. 8vo. New York, 1859.

Life of Frederick Schiller. By T. Carlyle. 12mo. Philadelphia, 1859.

Encyclopædia Britannica. Vol. XVIII.

Acadia. By F. S. Cozzens. 12mo. New York, 1859.

Carlyle's History of Frederick the Great. Vols. 1, 2. 12mo. New York, 1859.

Memoir of the Empress Catherine II., written by herself. 12mo. New York, 1859.

Leaves from the Note-Book of a Naturalist. By W. J. Broderip. 8vo. Pamph. Boston, 1859.

Oliver Cromwell's Letters and Speeches. By T. Carlyle. 2 vols. 8vo. New York, 1858.

Queens of Scotland. By Agnes Strickland. Vols. 6, 7, 8. New York, 1859.

The French Revolution of 1789. By J. S. C. Abbot. 8vo. New York, 1859.

Perry's Expedition to Japan. 8vo. New York, 1856.

Washington in Domestic Life. By R. Rush. 8vo. Philadelphia, 1857.

Life of J. Montgomery. By H. C. Knight. 12mo. Boston, 1857. *Deposited by the Republican Institution.*

October 5, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. F. Winslow read a paper on "Geological Revolutions."

A communication was read from Mr. George Curtis, of Newton Lower Falls, on the habits of the trout or short-nosed pickerel, (*Esox fasciatus.* Dekay.)

It is generally found either in what are called "water-bushes," (*Cephalanthus occidentalis,*) or in pickerel-weed. During dog-days, when other pickerel are found at the bottom in the channel, these are taken in the same localities that they frequent at all seasons, and are rarely, if ever, taken in the deep channel water. They take the bait with great eagerness, and, turning abruptly, make back into the shallow coverts whence they darted. The

long-nosed species, on the contrary, moves to the deep water, there to devour its prey. They take the bait readily at all seasons and all times of day, being much more voracious than the other species; the same individual is frequently caught after having been several times drawn from the water. They live longer out of water, and remain flaccid for a greater length of time after death; their sight is much stronger, and they move quicker. In warm weather, and in certain localities, it is necessary to trail deep and slow for the shovel-nosed pickerel, or they will refuse the bait, — and even then the bait must be of a kind they specially prefer; the trout-pickerel, on the contrary, will take almost any bait, at the surface or beneath it, moving fast or slow; its voracity is such, that it is known to take the bait with the tail of a yet undigested fish visible in its mouth.

Dr. C. T. Jackson exhibited some crystals of green feldspar, from the sea-wall, near Southwest Harbor, Mount Desert, Maine.

It is found crystallized in quartz veins and pockets, near the shore, in a rock exceedingly hard. It is abundant, and some crystals are found four inches square, polished by the sea water. Heretofore this has only been found in Siberia, and is considered rare and valuable. It admits of a high polish, and is valued as a gem under the name of "Amazon Stone." Crystals of yellow feldspar were also found in this locality; both by Dr. W. F. Channing.

Dr. Jackson also exhibited specimens received from M. Daubrèe, of Strasbourg, of the minerals artificially produced by his process referred to at the meeting of April 6, 1859, — *viz.* chabasie, apophyllite, harmotome, and quartz crystals. The bricks from the old Roman works, acted upon by the hot waters of Plombières, as well as the cement, displayed zeolitic minerals in their interstices. The specimens of quartz were microscopic, but were pronounced by Dr. Bacon to be quartz crystals, whose sharp angles show that they could not have been dissected out of the glass matrix.

Among some specimens recently received from Oregon Territory, was a piece of a meteorite containing crystals of olivine, yielding 9 per cent. of nickel. It was identical in appearance, and probably in composition, with the Pallas meteorite of Siberia; he thought it not improbable that pieces may have fallen in the same meteoric shower in both countries, as has happened in other instances, though less widely separated.

Dr. Jackson read a letter from Emilien de Wael, of Antwerp, asking that deficiencies in his copy of the Society's Journal might be supplied, and also soliciting recent and especially freshwater species from this country: it was referred to the Committee on Publications and to the Curator of Conchology.

Dr. Kneeland exhibited a growing specimen of *Testudinaria elephantipes*, an endogenous plant of the family *Dioscoreaceæ*, and a native of South Africa.

Mr. Samuels presented a series of thirty microscopic slides, to be used for purposes of exchange with the London Microscopical Society. They were referred to Dr. Durkee, Mr. Stodder, and the Committee on Publication.

October 19, 1859.

The President in the Chair.

Dr. Gould presented descriptions of shells, collected by the North Pacific Exploring Expedition, as follows:—

PATELLA GRATA. T. ovato-conica, elevata, apice acuto admodum antico, extus rudis, cinerea, costis elevatis compressis juxta marginem tubulosis radiata; margine expanso denticulato;

intus ochracea fusco variegata, spatulâ et submargine intensè castaneis. Long. 30 millim.; lat. 24 millim.; alt. 14 millim. From the north shores of Niphon. Mr. Brooke.

PATELLA PALLIDA. T. obliquè pyramidata, cinerea, rudis, apice parum antico, costis inequalibus rotundatis variè dispositis ad 20 instructa; apertura rotundato-ovata, margine indentato, submargine cinereo, cavositate porcellano, spatulâ haud coloratâ. Long. 40, lat. 33, alt. 30 millim. Inhabits Hakodadi Bay, on stones and gravel, 10 fathoms. W. S.

ACMÆA DORSUOSA. T. ovoidea, rudis, costis inequalibus angustis humilibus tuberculatis ad 20 instructa; apice antico, acuto decurvato; intus virescens, spatulâ (centro plerumque excepto) castaneâ, margine ferè integro ad costas castaneo. Long. 20, lat. 15, alt. 10 millim.

Habitat, Hakodadi on rocks of 2d and 3d laminarian zone. W. S. Closely allied to *A. patina*, or that variety of it named *monticula* by Nuttall. The apex is more central, ribs more tubercular and less angular.

SCUTELLINA UNGUIFORMIS. T. parvula, alba, lucida, rotundato-elliptica, depressè fornicata, apice minuto deflecto, paginâ externâ striis concentricis et radiantibus minutissimis decussatâ versus apicem gemmulatâ. Long. 6, lat. 5, alt. 1 millim. Hab. Kagosima. W. S.

SCUTELLINA SCOBINATA. T. parva, cinnamomea, rotundato-ovata, admodum elevata fornicata, apice terminali, deflecto; extus undulis concentricis et striis confertissimis radiantibus ornata et granulis elongatis obliquis inordinatis scobinata; intus subnacrea. Long. 8, lat. 7, alt. 4 millim. Hab. Ousima. W. S.

EMARGINULA PILEATA. T. minuta, straminea, oblique ovato-conica, costis granulosis numerosis radiantibus ornata; apice anticali, obtuso; apertura ovato-rotundata; margine crenulato; fissura profunda retrorsum in canalem externum clathratum protracta. Long. 5, lat. et alt. 4 millim. Hab. Loo Choo. W. S.

EMARGINULA (Clypidina) ALTILIS. T. parva, obliquè conica, elevata, sulcis confertis radiantibus et liris tenuibus concentricis insculpta; apice obtuso, recurvo; apertura ovalis; margine cre-

nulato; fissura profunda retrorsum in canalem externum reducta. Long. 5, lat. 4, alt. 4 millim. Hab. Kagosima Bay, 10 fathoms, gravelly. W. S.

More simply and finely striate than any other species.

E. (Clypidina) RADIATA. T. cinerea, elliptica, costis radiantibus imbricatulis ad 17 et costulis intermedianis ad 3 ornata, propè apicem acutum deflectum submedianum clathrata; intus viridi radiata, margine denticulato; fissura curta in canalem internum versus apicem producta. Long. 12, lat. 8, alt. 7 millim. Inhabits Sydney Harbor. W. S.

E. (Clypidina) TEXTILIS. T. parvula, tenuis, fusco et cinereo variegata, ovato-rotundata, costulis concinnè imbricatis (tertio vel quarto plerumque majore) radiata; apice subcentrali acuto; intus viridi vel zonata vel radiata, margine crenulato; fissura satis profunda posticè in canalem internum ad apicem producta. Long. 9, lat. 7, alt. 4 millim. Hab. Ousima, on surf-washed rocks. W. S.

RIMULA ECHINATA. T. parva, ovalis, costata, costis inequalibus echinatis, interstitiis simplicibus (?), apice acuto revoluto; foramine oblongo anticè rotundato, posticè in canalem clathratam reducto; margine indentato. Long. 9, lat. 7, alt. 4 millim. Hab.: Gaspé Straits.

An imperfect description from the figure of a shell unfortunately lost or missing. It seems different from the three recent species already described, but possibly may be *R. propinqua* A. Ad.

CHITON (Lophyrus) LUGUBRIS. T. parva, solida, punctata, elongato-ovata, vix carinata, smaragdina; areâ centrali liris longitud. pectinatâ ad apicem lævi; areis lateral. elevatis, liris ramosis nodulosis instructis; valvis terminalibus magnis propè marginem radiatis, umbone subcentrali; ligamentum latum, squamis magnis transversis convexis obtectum. Long. 25, lat. 15 millim. Hab.

C. (Leptochiton) COMPTUS. T. parvula, tenuis, elliptica, aut viridis aut incarnata sæpè albido vel flavo variè fasciata punctata vel maculata; valvis brevibus, terminalibus radiatim costatis etiam punctatis, areâ centrali quincuncialiter punctatâ; areis late-

ralibus elevatis et sulcis radiantibus 4–5 insculptis; intus viridans; ligamentum angustum squamis parvis elongatis sulcatis imbricatum. Long. 15, lat. 10 millim. Hab. Ousima, Bonin and Loo Choo Is. W. S.

In form like *squamulosus* and *rugulatus*, but sculptured differently; possibly *C. caliginosus* Rv.

C. (Leptochiton) JACOBÆUS. T. parvula, cinerea, elongata, elliptica vix carinata; valvis terminalibus permagnis, fornicatis, costis scabris radiantibus ad 10 ornatis; areâ centrali cancellatâ; areis lateral. conspicuis, bicostatis; ligamentum angustum, squamis minutis elongatis obtectum. Long. 12, lat. 5 millim. Hab. Simoda. W. S.

The vaulting and ribs of the two large terminal valves make them resemble two small Pectens.

C. (Leptochiton) CONCINNUS. T. minuta, rubida, elliptica, fornicata, omninò punctata, punctis seriatim dispositis, seriebus radiatim flectantibus; areis lateralibus haud elevatis, longitud. undulatis; valva antica crescentica; v. postica acutè umbonata concentricè undulata; ligamentum angustum, lutescens, pruinosum. Long. 8, lat. 5 millim. Hab. Hakodadi. W. S.

In size and form like *C. albus*, but sufficiently distinct by its evident lines of punctures.

C. (Leptochiton) CRATICULATUS. T. tenuis, fusco-cinerea, lata, elliptica, admodum carinata; areâ centrali longitud. clathratâ, clathris elevatis, acutis; areis lateral. angustis, elevatis, liris eminentibus asperis divaricantibus 4–8 instructis; valvâ anticâ crescenticâ radiatim liratâ; v. posticâ vix umbonatâ radiatâ; ligamentum latum, squamis minutis elongatis striatis vestitum, fusco-fasciatum. Long. 30, lat. 20 millim. Hab. China Seas, probably Simoda.

The number of ridges on the lateral areas and terminal valves varies much.

C. (Lepidopleura) LEPIDUS. T. parva, elliptica, tectiformis, flavo-virens olivaceo strigata; valva antica semicircularis, radiatim striata; v. postica crescentica, umbonata, radiata, anticè longitud. sulcata; areis lateral. elevatis, sulcis radiantibus ad 6 insculptis; areâ centrali imbricatim sulcatâ; ligamentum angustum

olivaceo fasciatum, squamis minutissimis vestitum. Long. 13, lat. 9 millim. Hab. China Sea, lat. 24° N. W. S.

This deeply sculptured little species resembles generally *C. Siculus*.

C. (Chætopleura) PLUMOSUS. T. fusco-cinerea, ovata, valvis concavis vix umbonatis; valvâ anticâ liris radiantibus plumosis ornatâ; v. posticâ parvâ, umbone marginali et costâ submarginali utrinque notatâ; areâ centrali magnâ striis divaricantibus et striis lateralibus plumosè coadunatis ornatâ; areis lateral. parvis, costâ marginali finitis, striis denticulatis, interspatiis clathratis. Ligamentum latum coriaceum, tubulis (setigeris?) instructum. Long. 1.5, lat. .75 poll. Hab.

Allied to *C. cælatus* Rv., which is said to be highly ornamented with green and pink. *C. Collei* and *C. muscosus* G. belong to the same group.

C. (Acanthochætes) ACHATES. T. angusta, elliptica, deluta, fuliginosa, strigâ flavâ utrinque ornata, valvis scutiformibus rostratis et carinatis, apicibus ebeninis glabris, alibi squamatim granulata; valvâ anticâ semiovali; v. posticâ parvâ, trigonâ, umbone subterminali; intus glauca. Ligamentum latum spinis curtis inequalibus et fasciculis spicularum munitum. Long. 30, lat. 20 millim. Hab. Kikaia and Hakodadi Bay. W. S.

C. (Molpalia) STIMPSONI. T. tenuis, rotundato-ovata, depressa, fastigiata, fusca, rufo, rosaceo viridi et flavo marmorata vel lineata, concentricè striata; valvis angustis planatis; areis lineâ elevatâ finitis; valvâ anticâ parvulâ, crescenticâ; v. posticâ minimâ, emarginatâ. Ligamentum coriaceum anticè valdè dilatatum, pilis fimbriatum. Long. 1.5 poll., lat. 1 poll. Hab. Hakodadi Bay. W. S.

Related to *C. Blainvillei*, but smaller, has no perceptible radiating lines on the anterior valve, and is not so vividly colored.

DENTALIUM ACICULUM. T. modica, tenuis, levis, nitida, lactea, admodum arcuata, propè apicem longitudinaliter sulcata, alibi undulis annulatis interdum obliquis ornata. Apertura circularis. Long. 30, diam. 3 millim. Hab. Coast of China, 23° 50′ N. in sand 25 fathoms. W. S.

DENTALIUM HEXAGONUM. T. elongata, attenuata, ossea, arcuata, hexagona, angulis obtusis, lateraliter compressis, interspatiis inornatis; peristomate sexangulari. Long. 55, diam. 4 millim. Hab. Hong Kong, in shelly mud.

DENTALIUM BUCCINULUM. T. modica, lactea propè apicem rubiginosa, admodum arcuatum, longitudinaliter sulcis ad 30 arata, versus aperturam evanescentibus, ubi lucida. Long. 30 mill. diam. 3 millim. Hab. Kagosima. W. S.

Most nearly allied to *D. curtum*, but is more deeply grooved.

DENTALIUM INTERCALATUM. T. parva, albida, acuta, rapidè ampliata, ad apicem sulcis primum sex deinde 12 æqualibus longitudinalibus sulcata. Long. 18, diam. 2+ millim. Hab. China Seas. W. S.

DENTALIUM STRIGATUM. T. benè arcuata, albido-rubescens, sulcis amplis concavis longitudinaliter striatis ad 13 insculpta, dissepimentis angustis, obtusis. Long. 18, diam. 3 millim. Hab. False Bay, C. Good Hope. W. S.

DENTALIUM PORCATUM. T. modica, cretacea ad apicem plus minusve rubiginosa, benè arcuata, sulcis tenuibus longitud. 12 sensim ad 20 auctis arata. Axis 20, diam. 2.5 millim. Hab. Hong Kong Harbor. W. S.

DENTALIUM CLAVATUM. T. parva, clavata, polita, tenuis ferè hyalina admodum arcuata lateribus obliquè undulatis, versus aperturam valdè contracta. Long. 10, diam. 2 millim. Hab. Hong Kong; not uncommon. W. S.

This would be regarded as a Ditrupa had not Mr. Stimpson given a figure of the animal, which he assures us is a mollusk. It resembles *D. coarctatum* Desh.

Prof. Agassiz made a communication on reversed bivalve shells, and exhibited a specimen in the *Unio ligamentinus*, (Lamarck.)

In this genus, on the right side in the normal shell there is one cardinal tooth and one long laminar tooth, and on the left two cardinal and two laminar teeth. Reversion of bivalve shells is quite rare, and generally not easily observed except in those with un-

equal valves; and it is more common in gasteropods than in acephala.

Dr. Gould expressed the belief that the geographical distribution of unios would throw much light on generic distinctions, and that each large basin would be found to possess its peculiar animals.

Prof. Agassiz observed that this relation was especially observable in regard to fishes, though they have peculiar facilities for changing their locality. He instanced the Rhine, Rhone, and Danube, which in their head waters in Switzerland contained the same fishes; while lower down, the fishes of each river are not only different from each other, but those of the lower portion are different from those in the upper.

A specimen of the *Odontaspis griseus*, described by Mr. Ayres as *Carcharias griseus*, was presented by Dr. D. H. Storer.

This is a rare shark on our coast; the specimen, a female, was about four feet long. On each side of the teeth at the base was a small toothlet, and the upper lobe of the tail was much longer than the lower, and indented on the lower edge near the tip, differing in this respect from *Oxyrhina*, (Ag.) in which the upper lobe is but little longer than the lower.

Prof. Wyman gave an account of some observations on the shedding of the antlers of the American red deer.

After the rutting season is past, and, in consequence of the stoppage of the circulation through them, they have become dry and dead, the antlers are separated from the living frontal bone by a process of absorption carried on by the Haversian canals. These acting on one plane through the whole thickness of the bone just below the "burr," remove the solid materials around them, so that each canal becomes dilated on that plane until its cavity unites with that of an adjoining one. When this process has extended entirely across the base, the antler drops. The fall of the antler was shown to have a close resemblance to the process by which, in necrosis, the dead is separated from the living bone.

He also was disposed to regard the antler as a dermal bone, rather than a portion of the endo-skeleton; 1st, because it is developed in the integuments by a special centre of ossification, and only becomes attached to the frontal bone after ossification has somewhat advanced; 2d, because the permanent antlers of the Giraffe do not become united with the cranium except by suture until late in life, and are developed over the parietal as well as the frontal bones, without being divided on the line of the sutures of these two bones, which they would be were they merely epiphyses of them.

November 2, 1859.

The President in the Chair.

Prof. William B. Rogers exhibited a fossil cast in sandstone of part of the trunk of a large Sigillaria, from the South Joggins in Nova Scotia, where, as first shown by Logan and Dawson, these and other stems belonging to the carboniferous age occur at numerous levels in the strata, and are to be seen standing in the erect position in which they grew.

In considering the process by which these stems were originally enveloped by the mass of sediment now inclosing them in the shape of sandstone and shale, an inquiry of much interest is suggested *as to the rate of accumulation of the deposit in which they are buried.* Many of these erect trunks are of very considerable height, and one is mentioned by Sir Charles Lyell as traceable vertically across the strata for a distance of twenty-five feet. In all such cases the decay of the tree could have made no great progress before the trunk became buried to the whole observed depth, otherwise it would have become too weak to maintain an erect position, and must have fallen over. We infer, therefore, that the mass of sediment even to the height of twenty-five feet, in the case above cited, must have been accumulated around the stem in a period extending at farthest only to the earlier stages of change in the organic structure. Moreover this conclusion is strongly confirmed by the fact, that the peculiar

markings of the outer wood, and even of the bark, are often found impressed so distinctly on these erect sandstone casts as to afford a means of discriminating the character of the plant.

It seems therefore undeniable, that in these cases the mass of sediment, amounting sometimes to twenty-five feet, was accumulated around the standing tree in a very short time, a mere moment as compared with the units according to which geologists are accustomed to reckon the growth of such deposits, in the usual way of sedimentary accumulation. Yet a little consideration will show, that facts of this kind furnish no support to the opinion of those whose imperfect acquaintance with geological data have led them to deny the necessity of prolonged cycles of formative action in the production of the great systems of sedimentary strata.

In explaining the rapid entombment of the trees in their vertical position, it should be borne in mind that there are two processes very distinct from each other by which sediment may be accumulated over a given area. One of these is the series of actions by which the materials of preëxisting rocks, worn down, and diffused by tides and currents, are deposited more or less equally over wide regions, so as to build up step by step a newer system of formations. The other consists in the transfer of sediment already accumulated, from one part of the bed of the sea or estuary to a neighboring one. In the former process it would seem clear, from all the geological data, that vast periods of time must have been consumed. The latter being nothing more than the sweeping of soft sand and mud from one submerged area to another in its vicinity, would require no other agency than some unusual local disturbance of the waters, such as might result from earthquakes or great inundations, and would demand but a short time for its completion. In this view, the thick mass of sandstone and shale inclosing the erect trunk of the fossil tree, although accumulated at this particular part of the carboniferous area in a very short time, is not to be regarded as simply the product and measure of this brief geological moment. Considered in relation to its previous history in the carboniferous period, it rather represents the comparatively long series of combined actions which brought its materials into suspension in the waters, and gradually deposited them over the area, from which they were afterward so rapidly removed.

In framing any conjecture as to the length of time corresponding to the formation of a group of strata at any particular locality, as the Joggins, we would of course ascribe but a small value in years to such masses of deposit as thus prove themselves to have been hastily accumulated at the spot where they are found. But on the other hand we should be careful not to apply the same measure of rapid accretion to those associated beds of shale, limestone, coal, and even sandstone, which give intrinsic evidence of having been tranquilly and slowly deposited. We should also keep in view the important fact, that while one part of the column of strata whose chronology we are studying has been thus rapidly built up, by the materials swept into it from a neighboring quarter, other parts of the same column have been reduced in thickness, or even wholly removed, by similar local actions in the opposite direction; and *that therefore the strata as they stand give us the measure of a time much less than that in which, as a group, they were actually deposited.*

Prof. Rogers next proceeded to compare the Lower Carboniferous rocks of Nova Scotia and New Brunswick, which he had lately in part examined, with certain groups of strata holding a corresponding geological position in the Appalachian belt of the United States.

Early in the geological surveys of Virginia and Pennsylvania, it was found that two groups of strata of great thickness were interposed between the series of arenaceous red rocks forming the top of the Devonian and those massive conglomerates and sandstones which usually mark the base of the true coal measures.

Of these intervening masses, the *Lower Group*, consisting of conglomerates, sandstones, and sandy slates, and shales, usually of a brownish and greenish gray color, abounds in impressions of Lepidodendra and other terrestrial plants allied to those of the true coal measures, although not in general identical with them, and includes in some of its outcrops one or more considerable seams of coal.

The *Upper Group*, exposed along the northeastern margin of the coal region of Pennsylvania, consists of a great thickness of red shales and sandstones, passing upward into buff argillaceous sandstones, and including at some points a few calcareous layers,

with now and then the impression of a mollusk. In its extension toward the southwest it becomes rapidly more and more calcareous, until in the valley of the New River in Virginia we find it embracing a limestone formation upward of fifteen hundred feet in thickness, most of which is crowded with carboniferous fossils. In this district, and as traced further toward the southwest, this upper group presents in the ascending order the following succession of mineral masses.

First — Argillaceous red and green shales becoming more calcareous, and in the same proportion more fossiliferous, toward its upper limit.

Second — The great mass of limestone above referred to, consisting of an alternation of compact and often oölitic strata with more argillaceous beds weathering into calcareous shale, and containing throughout a great abundance and variety of carboniferous fossils.

Third — Red and variegated shales, with thin strata of limestone containing similar fossils; and

Fourth—Alternations of red sandstone and red shale with brown, buff, and gray sandstones, the latter varieties predominating toward the top of the series. To this succeeds the conglomerate and other coarse sediment forming the floor of the true coal measures.

The *lower* part of this group, in its most southern outcrop in Virginia, includes *a great thickness of gypsum*, while the gray and brownish sandstones abounding in the upper portion are often impressed with vegetable remains, and in some instances contain plates, and even thin seams of coal.

The distinctive features of these two great groups of strata, as well in organic contents and lithological character as in their influence upon the topography of the regions in which they occur, early led the State geologists of Pennsylvania and Virginia to regard them as separate divisions of the carboniferous system, and to designate them severally by the numbers X. and XI. in the numerical classification of their surveys; titles which, without altering the assigned limits of the two groups, they have replaced in their later nomenclature by the terms Vespertine and Umbral series. More than twenty years ago they made known the existence and geological position of these formations through the descriptions and

tracings of the Virginia and Pennsylvania Reports, and they have since always assigned them a prominent place when treating of the order and character of our paleozoic rocks. The carboniferous relations of the lower or Vespertine group, taken in connection with its depth beneath the true coal measures, were early recognized as a feature of peculiar geological interest, and in 1849 Prof. Rogers had made it the subject of a special communication to the British Association, on which occasion he called the attention of British geologists to the existence in the United States of this group of plant-bearing strata, and even of coal measures, beneath several thousand feet of marine deposits, having the general characters of the great carboniferous limestone of Europe, and remarked upon the vast interval of formative actions which must have intervened between the production of these earliest carboniferous rocks and the true coal series. This slight reference to the history of the subject will show how early and by whom the two formations in question were first clearly recognized and introduced into a classification of the North American strata.

In the recent publications of Prof. Dawson on the carboniferous rocks of New Brunswick and Nova Scotia, so ably explored by himself, Sir Wm. Logan, and Prof. Robb, we find this geologist virtually recognizing a similar binary subdivision of the great series of deposits which form the lower carboniferous system of these regions, describing those which lie at the base of the series as the *lower coal measures*, or lower freshwater or estuarine deposits, and the remainder as the *lower carboniferous marine deposits*.

Combining the data collected by Prof. Dawson and others with his own observations during the past season, Prof. Rogers had become satisfied of the close parallelism of these two divisions of the carboniferous rocks of Nova Scotia and New Brunswick with the above described Vespertine and Umbral groups respectively, especially as the latter are developed in the valley of the New River, and the adjoining region toward the south. The sandstones and slates of the Gaspereau, and of Horton Bluffs and Half-way River, as well as other localities on the Bay of Mines, and the corresponding formation containing the asphaltic coal of New Brunswick, all underlying the gypsiferous marls and limestone, with carboniferous fossils of these regions, seem to be clearly

referable to the same geological horizon with the great mass of plant and coal-bearing rocks comprised in the Vespertine series, which, as we have seen, lie immediately beneath the gypsiferous marls and carboniferous limestone of southwestern Virginia. The red marl and limestone of the gypsiferous group in Nova Scotia and New Brunswick, with those alternations of red and variegated shales and sandstones which are seen overlying them on so grand a scale in the section of the South Joggins, obviously occupy the same geological place as the analogous Umbral series of the Appalachian formations. In both regions we see the lower carbonaceous strata, the accumulation of extensive swamps and estuaries, succeeded by a vast series of marine formations, in the shape of red and variegated marls and shales and beds of limestone, thronged with remains characterizing the carboniferous period; and in both, as we approach the upper limit, we see alternations of shales and sandstones with plants and occasional films of coal, marking the fluctuating dawn of those physical conditions which were to culminate in the vast vegetable deposits of the coal measures.

Prof. Agassiz inquired what proof there was that the carboniferous series so-called is a single formation. As an instance of the manner in which the extension downward of a geological series had been made, he instanced the Jura, which twenty years ago was considered a single formation, but which is now divided into seven or nine distinct formations, each with its characteristic fossils.

Prof. Rogers replied that he used the term "carboniferous series" as a convenient expression for a group of formations of a certain geological period, without implying that it was a single formation; indeed, he and his brother had long since made a triple division of the series, giving to each division a separate name.

Prof. Wyman alluded to the idea of Prof. Lyell, that if the trees of this period were hollow, the remains of animals might occasionally be dropped in; and such remains were actually found and described by him a few years ago. Since then, Prof. Dawson had examined further, and had found remains of an articulate like *Julus*, and more bones of reptiles, viz: of eight

individuals of *Dendrerpeton*, and three of *Hylerpeton*, a new genus of batrachian reptiles, with a new species of *Dendrerpeton*.

Dr. C. T. Jackson read a letter from Dr. Evans, of Oregon Territory, confirming his former opinion that the meteorite recently found in that Territory is identical with the Pallas meteorite of Siberia.

He also exhibited a specimen of the tin ore of Los Angelos, California.

Dr. J. Mason Warren exhibited the dissection of a young lioness, two months old.

November 16, 1859.

The President in the Chair.

Dr. White exhibited some living larvæ in water, said to have been vomited from the human stomach. They were very active, and belong to the genus *Corethra* of the family *Tipuladæ*. The person reported to have ejected them had been drinking water from a newly made well, from which the larvæ were drawn; they probably had never entered the human stomach, where they would have been soon destroyed. The following is a description of these larvæ :—

The length $\frac{3}{4}$ of an inch; head lozenge-shaped; upper jaw proboscis-like, and terminated by a double hook bent down at a right angle; lower jaw short, and composed of two small hooks directed upward toward base of proboscis. Eyes black and prominent; neck short, followed by a large globose segment furnished with two crescentic inclosed spiracles; six following segments cylindrical, globose, and tapering to the eighth, which is enlarged to hold a pair of spiracles corresponding to the first; two terminal joints long and tapering, the last furnished with a fan of bristles posteriorly and below.

Dr. White also presented, from Dr. Bowditch, a specimen of a hair worm (*Gordius*) said to have passed from the human body after the use of aloes, though it probably never was so passed. It does not answer to either of the two described by Dr. Leidy; he proposed for it the name of *G. trifurcatus*. The description is as follows:—

MALE. Length 5 inches; diameter $\frac{1}{3}$ line; shape uniformly cylindrical; head obtusely conical; posterior end divided into two long and narrow lobes, and one shorter and broader lobe, incurved and fringed with short thick hairs. At base of larger lobe is the genital opening, from which the spermatozoa are seen escaping with extremely long tails. Color uniformly light brown.

The President remarked that the children of Mendoza, at the foot of the Andes, not unfrequently have the nostrils infested by the larvæ of a fly; the affection is accompanied by a discharge at first mucous and afterward bloody, and sometimes proves fatal; the perfect insect resembles our blue-bottle fly, but is smaller. Similar instances have been observed on the Pacific coast of South America, and in Cayenne.

Prof. Wyman inquired if any of the members had seen any accounts of recent elephants having been swamped in large numbers. Rev. Mr. Walker, of the Gaboon Mission, informed him that such an instance had occurred in that vicinity, where many elephants had thus perished together in a mud hole. The fact is interesting, as showing at the present epoch causes of death similar to those which probably existed in the time of the mastodon, several of which were found together in New Jersey, supposed to have been mired in the same locality.

Dr. C. T. Jackson read some letters from Dr. Evans, concerning the meteorite discovered by him in Oregon Territory; the mass, about three feet of which was above ground, was in the mountains, about forty miles from Port Orford, on the Pacific, and easily accessible by mules. He hoped the Society, as a body or individually,

would take speedy and proper measures to secure its deposition by government in the Smithsonian Institution.

Prof. W. B. Rogers made some remarks on the geology of the neighborhood of St. John, New Brunswick, and described, by the aid of a section, the stratigraphical features exhibited at the junction of the older and less ancient groups of strata on the St. John and Kennebecasis rivers, a few miles above the city, as observed by Prof. Robb and himself during the past summer. Here the steep-dipping slates and limestones of the older group may be seen suddenly giving place to nearly horizontal beds of reddish conglomerates, which abutting against them, and in part resting on their upturned edges, present a very striking example of unconformable contact.

Referring to the probable ages of the two groups, Prof. Rogers mentioned the fact that hitherto the only fossils discovered in the belt of metamorphic slates and limestones ranging along the northern side of the Bay of Fundy, and on which St. John was built, consisted of vegetable impressions of a rather vague kind found by Prof. Robb at several localities, and of which specimens may be seen in the olive slate of the hill near the cathedral. To these Prof. Rogers was now able to add a fossil which he hoped might prove more definite in its indications. In his explorations around the city he had found loose pieces of silicious slate, containing black scale-like *fragments of shells*, and had afterward discovered, at several points, the layers of rock, in place, crowded with these remains, the more entire of which presented the form and markings of a *Lingula*.

Mr. Charles H. Wing, of Boston, was elected a Resident Member.

December 7, 1859.

The President in the Chair.

Prof. Rogers presented the following communication on the meteor of August 11, 1859, by Mr. David A. Wells:

On the morning of the 11th of August, 1859, at 7 o'clock and 20 minutes or thereabouts, thermometer 73°, air still, and the sun shining brightly, a meteoric body of great size and brilliancy was observed throughout a large portion of Western New England and Eastern New York, which exploding violently threw down to the earth at least one fragment of its mass, in the vicinity of Albany, N. Y.

The main facts connected with this interesting phenomenon, collected from numerous and widely separated observers, are as follows:—

By observers generally, north of Albany, the meteor is described as appearing in the southeast, at an elevation of from 45° to 60°; thence it passed rapidly to the south, and disappeared a little west of south, at an elevation of from 10° to 15°. Its course, throughout its visible range, was marked by a heavy train or trail of smoke, which continued visible for some time after the meteor itself had disappeared; and at two or three points in its course, large volumes of smoke were observed to form, as if the result of successive explosions. These volumes of smoke were observed to be in a state of great agitation, and in size were compared to the cloud of smoke produced by the discharge of a six-pounder.

To observers, generally, south of Albany, (twenty miles or more distant,) the meteor was first seen in the northeast, and disappeared in the northwest; a fact which indicates the path of the body to have been nearly coincident with the parallel of Albany.

A few minutes after the disappearance of the meteor, the lapse of time being variously estimated, by differently located observers, at from thirty seconds to two minutes, two or three loud and successive explosions or reports were heard, accompanied by prolonged echoes and a violent concussion. These sounds have been compared by some to sharp and heavy peals of thunder, to the report attending the explosion of a powder mill, or steam boiler, and also to the rumbling of heavy carriages on a bridge. In Troy, the concussion and jarring were sufficiently intense to suggest the idea of an earthquake; people walking in the streets involuntarily stopped, and for a moment nearly every occupation was suspended. At Schaghticoke, N. Y., and Bennington, Vt., where powder mills are in operation, the report was referred to

explosions at the works. At Eagle Bridge, on the Troy and Bennington Railroad, the concussion was forcible enough to jar the windows and shake the seats of a train of cars in motion. At Greenbush, opposite Albany, numbers of people rushed to the docks, under the supposition that a passing steamboat had exploded her boiler. The noise and concussion also appear to have been noticed, to nearly an equal extent, at points sixty miles east of the Hudson, while the whole area over which the sound is positively known to have been *heard* with distinctness was upward of two thousand square miles. The area of country, on the other hand, over which the meteor was *seen*, was, as might have been expected, much larger than the area over which the explosions were heard, being at least equal to six thousand square miles. Thus, observations were made upon it at Morristown, Lamoille Co., Vermont, twenty-five miles north of Montpelier, and at South Manchester, Conn., a point nearly two hundred miles south; it was also observed at localities west of the Hudson River, and at various points from thirty to fifty miles east of the Hudson. Within a radius of thirty miles northeast and southeast of the city of Troy, it was probably observed by every person out of doors, who was at the time looking in a southerly direction; yet such is the unreliability of human testimony as regards natural phenomena, that no two observers can be found to agree as to many important particulars, such as apparent size, period of visibility, direction, altitude, &c.

The estimates formed of its size are exceedingly discrepant; some observers comparing it to the sun, or full moon, and others to a sky rocket, or the luminous ball projected from a Roman candle. All agree, however, that its appearance even in full sunshine was exceeding bright and dazzling, the light being at the same time of a reddish color. So bright, indeed, was it at Strafford, Vt., a locality nearly one hundred miles north of the probable point of explosion, that its distance was estimated as not exceeding a half a mile from the point of observation.

A single fragment only of the meteor is positively known to have fallen. This was found in Bethlehem, Albany Co., N. Y., and at a point about ten miles west of Albany. The circumstances connected with the phenomenon related by the person who noticed it are as follows: —

While standing in the inclosure adjoining his house, his attention and that of his family was attracted by a loud sound, over head, which somewhat resembled thunder; and a few minutes after a stone struck the southeast side of a wagon-house, and bounding off, rolled into the grass. A dog lying in the doorway started up and ran to the place where the stone fell. When picked up immediately after, it was found to be quite warm, and possessed of considerable sulphurous odor. The fragment in question was small, about the size of a pigeon's egg, and irregularly shaped. Nearly three fourths of its superficies was covered with a black, non-lustrous, evidently fused crust, while the remainder presented the appearance of a fresh fracture, and was of a light-gray color, and of a granular or semi-crystalline texture. Its composition was apparently silicious and not metallic. This specimen was bought by the Regents of the University of the State of New York, and is now deposited in the State Cabinet at Albany. Other fragments are reported to have fallen in the vicinity of the Hudson, but careful inquiry has thus far failed to discover them.

From the above facts it seems evident, that the meteor of August 11th was of immense size, probably of tons weight, and that it exploded violently at no great distance above the surface of the earth. It is also an interesting subject of speculation as to what became of the other fragments; and also of what the smoke so abundantly developed during its course was composed.

The Curator of Entomology read the following posthumous paper by the late Dr. T. W. Harris: —

Observations on the Transformations of the Cecidomyiæ. By T. W. Harris, of Cambridge, Mass.

The following are understood to be established doctrines concerning the transformations of insects:—

During the growth of an insect, new membranes or skins are successively formed or matured beneath the outer skin, whether the latter be immediately cast off or temporarily retained. The innermost or last-formed membrane becomes the skin of the *imago;* the penultimate is the skin of the *pupa;* and the antepenultimate is the skin of the *larva*. The *Ephemeræ* moult their

skins once, after taking the imago form. Moreover, many larvæ cast their skins repeatedly before assuming the pupa state. Some, however, do not moult the larva-skin till they are about to become pupæ. Other insects, during the pupa state, retain the loosened larva-skin, and this forms a case or kind of cocoon for the included pupa. Dipterous insects are said either to cast off the larva-skin once only, that is, when they disclose the pupa, or, to retain it for a case to the pupa, which hence is called a *coarctate pupa.*

The writer does not recollect that any exceptions to the foregoing statements have hitherto been recorded by European entomologists. The transformations of the *Cecidomyiæ*, as observed by American naturalists, offer certain peculiarities or remarkable exceptions, which are now to be described. There are three modifications in the transformations that these insects undergo, represented respectively by *Cecidomyia salicis*, (Fitch), *C. tritici*, (Kirby), and *C. destructor*, (Say).

Cecidomyia salicis is an American species, inhabiting willow galls. Being of large size, it is an excellent object for the observation of the anomalous transformation that is common to it and to other species of the genus. The gall, produced by this insect, consists of a woody tumor, surmounted by the dry and brittle terminal bud, at the tips of the twigs of *Salix rigida* and *Salix lucida.* It contains only a single larva, which perforates the gall from the tip to the bottom, and, when fully grown, lines a portion of the cavity with a delicate silken web. During the winter, the larva remains unchanged, and in a dormant state, within its cell. The change to the pupa state occurs in the following spring, and is effected without any moulting of the larva-skin. Dr. Asa Fitch, the describer of the species, first called my attention to this fact, which has been confirmed also by my own observations. The approaching change is marked by an alteration of the color of the anterior segments of the larva, which, from orange, become red and shining, as if distended with blood. Soon afterward, rudimentary legs, wings, and antennæ begin, as it were, to bud and put forth, and rapidly grow to their full pupal dimensions; and thus the transformation to the pupa is completed. When the fly is about to be disclosed, the pupa bursts through the silken lining of the upper part of its cell, and works its way to the external

opening in the top of the gall, where it is retained while the fly disengages itself from the pupa-skin. The peculiarity of this kind of transformation consists in the fact, that the conversion to the pupa is effected without any moulting of the larva-skin, which is retained in a modified form, and becomes the proper skin of the pupa.

The American wheat-fly appears to be identical with the European *Cecidomyia tritici*. When the orange-colored larva of this species is fully grown, its body contracts and becomes loosened from the outer skin, which is so thin and delicate that the included larva may be seen through it. In this condition the larva remains quiescent several days, after which it extricates itself from its filmy skin, and recovers its activity, but takes no more food. The wheat-ears are often found full of these delicate cast skins, which are so light as to be wafted away by every breeze. Sometimes, though rarely, this moulting does not occur till after the larvæ have left the grain. Their descent is generally made in the night, and is facilitated by the heavy dews or falling rain. Having moulted and descended to the ground, the larva buries itself just below the surface, and there remains in a dormant state, and without change, till the following spring. A few days, at most, before its final transformation, this larva becomes a pupa. The manner in which this transition is effected is altogether similar to that which has been observed in *C. salicis*. The abdominal portion of the larva-skin undergoes little or no change; the forepart of the body becomes red, swollen, shining, and apparently gelatinous, and allows the budding limbs and wings to push outward, so that each member becomes enveloped in its own process of the yielding cuticle. The pupa then, though covered still with the larva-skin, which is merely modified by extension or growth, or both, to suit the changed condition of the insect, is not a true coarctate pupa; it is a naked pupa, with its limbs and wings exposed and free, and folded upon the breast. The insect continues in the pupa state only a very few days; it then makes its way to the surface of the ground, casts off its modified larva or pupa skin, and appears in the winged form. This is the only Dipterous insect which is known to cast off and abandon its skin while in the larva state. Other species of *Cecidomyia*, however, may be found to exhibit the same peculiarity.

The Hessian fly, or *Cecidomyia destructor*, (Say) is another European species, which has become naturalized in the United States, having been introduced seventy-five years ago. It furnishes an example of a third kind of transformation, but little, if at all, understood by European entomologists. The larva of this insect, when it has come to its growth, remains fixed and motionless on the culm of the wheat. Its body contracts, and soon takes the form and color of a flaxseed. While this change is going on externally, the body of the insect gradually cleaves from its outer dry and brownish skin. When this is carefully opened, the included insect will be seen to be still in the larva state. Mr. Westwood found it in this condition in a specimen sent to him from Vienna; and hence came to the erroneous conclusion that the European species was not the same as the American Hessian fly. But the fact is well established, that the American insect retains the larva form, for some time, within its external or penultimate flaxseed skin. It does not change its condition, indeed, until a few days before it discloses the winged insect. It does not appear to moult its last larva-skin, in order to become a pupa; for on careful examination, not the least vestige of a cast skin has been found within the flaxseed shell. The transition from the larva to the pupa state is effected in the same way as in the foregoing examples, by the softening of the anterior segments of the larva, to admit of the development of the limbs and wings of the pupa. The insect, in this stage, may be said to be *a coarctate pupa*, being inclosed within a brownish leathery skin or *puparium*, which, however, as before stated, consists, not of the last, but of the penultimate larva-skin. In due time, the pupa breaks open and crawls entirely out of its *puparium*, and resting between the leaf and the culm, its delicate skin is rent on the back, and the perfect fly extricates itself therefrom. In this example (and it seems not to be the only one in the genus,) two anomalies occur in the metamorphosis: first, the penultimate larva-skin becomes the *puparium*; and, secondly, the last larva-skin is only modified anteriorly, without being cast off, when the insect is changed to a pupa. It should be noted also, that in all these cases the pupa becomes active shortly before its final change.

The characteristics of the three varieties of transformations described in this communication may be thus briefly summed up.

1. Larva inclosed in a gall and in an imperfect silken cocoon, and passing to the pupa state without moulting its skin.

2. Larva exposed, and not inclosed in a cocoon; casting off its penultimate larva-skin; and becoming a naked pupa in the ground without moulting its last skin.

3. Larva (and pupa) remaining inclosed in the penultimate larva-skin; and becoming a coarctate pupa without casting off its last larva-skin.

For the specific characters of these and of some other species of *Cecidomyia*, illustrated by figures, the elaborate descriptions by Dr. Asa Fitch may be consulted.

Dr. B. J. Jeffries alluded to experiments which had been made by Dr. Mitchell at Philadelphia, and exhibited the results of similar ones of his own, in injecting strong solutions of sugar under the skin of frogs; if the animals be kept from water they die in a few hours, but if kept in water they recover, with, however, the production of a cataract in both eyes; the cataract being confined to the superficial posterior layers, the interior of the lens remaining clear.

Dr. Williams remarked that the cataract thus produced disappears in course of time; this is an interesting fact, as this condition in man never disappears unless the capsule of the lens be ruptured either spontaneously or by art. He had noticed cataract in persons affected with diabetes.

Mr. Stodder exhibited the tooth of a large sperm whale, with an abnormal nodular growth of *cementum* in the interior and about the base of the tooth.

Dr. C. T. Jackson presented, in the name of Jules Marcou, a pamphlet on the "Dyas and Trias," in which that author states that the Roxbury conglomerate belongs to the period of the new red sandstone, — an opinion from which Dr. Jackson entirely dissented, maintaining that it underlies the coal.

Mr. Bouvé remarked that he had been able to trace the gradual change from the conglomerate into a compact, homogeneous, almost jaspery rock, the latter being very striking in Hingham.

Mr. Theodore Lyman mentioned as an instance of the neglect of the study of the descriptions of our early zoölogists, the case of the *Ophiura appressa* (Say), which by way of exclusion he had determined to be the same as that recently called *Ophioderma virescens* (Lutken); the last agrees perfectly well with Say's description, is abundant in Florida, and differs from all other known Florida or West Indian species.

Mr. Stodder reported on the microscope slides presented by Mr. Samuels, Oct. 5, and referred to him for examination.

The specimens he found to be very interesting, and some of them new; especially the diatoms from the intestines of holothurians and echini — collected for Prof. Agassiz and Mr. J. M. Barnard. Many species have been ascertained to be common to the Sandwich Islands and the Mediterranean; some are common to England, Nova Scotia, Boston Bay, and the Sandwich Islands; others are common to the Sandwich Islands, Zanzibar, and Florida, — in fact, diatoms have long been known as the most cosmopolitan of organisms.

The new species, recognized as such, by Mr. A. M. Edwards, of New York, are *Synedra magna*, *S. Pacifica*, *Triceratium circulare* (with three and four sides), *T. elegans* (with three and four sides), and *T. undatum* (with three, four, and five sides). These variations raise the question again, whether there is any distinction between *Triceratium* and *Amphitetras;* several four-sided species are described by Mr. Brightwell, and the only difference between *T. Wilkesii* and *A. Wilkesii* (Harvey & Bailey) is the number of sides. Among the rare and recently described forms are *T. dubium* (Bright.), *Cocconeis fimbriata* (Bright.), and *Biddulphia reticulata* (Roper). *Campelodiscus striatus* (Ehr.), figured by Brightwell in the Journal of the Microscopical Society, is abundant, but he is satisfied that it is distinct from Ehrenberg's species, answering neither to the description nor the original figure of that species; he proposes to call it *C. Brightwellii*. *Synedra undulata* (Greg.) = *Toxarium undulans* (Bailey), and *S. Hennedyana* (Greg.), and *Naviculæ*, are abundant. *Navicula didyma*

and *N. lyra* are abundant, showing great variations within the probable limits of each species. There are two forms of Ehrenberg's genus *Actinocyclus*, called by most English writers *Eupodiscus; Stauroptera aspera* (Ehr.) = *Stauroneis pulchella* (W. S.) is abundant and variable; in the Zanzibar slides he had seen an *Auliscus* which may be new, and an *Isthmia* certainly new, with many forms common also to the Sandwich Islands. Mr. Edwards has undertaken to describe and figure the new species, for publication in the Journal of the Society.

The Corresponding Secretary read the following letters, viz: —

From Dr. A. Snowden Piggot, of Baltimore, and William Sharswood, Esq., of Philadelphia, accepting Corresponding Membership; from the Royal Geographical Society of London, the Société des Sciences Naturelles de Neuchatel, the Royal Society of Sciences of Göttingen, and the Natural History Society at Bonn, acknowledging reception of parts of Vols. 5 and 6 of the Proceedings of the Society, and No. 4 of Vol. 6 of the Journal; from the Royal Academy of Sciences at Berlin, and the Zoölogico-Botanical Society at Vienna, acknowledging the same, and presenting their publications; and from the Natural History Society of Emden, sending their Proceedings for 1858.

Prof. J. L. Riddell, M. D., of the University of Louisiana, and J. B. Avequin, M. D., of New Orleans, were elected Corresponding Members.

Messrs. N. S. Shaler and Burt G. Wilder of Cambridge, and W. E. Sheldon of West Newton, were chosen Resident Members.

December 21, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. Scudder read a paper by the late Dr. T. W. Harris, on *Cicindela Hentzii*: —

This insect was first described, under the name of *Cicindela hæmorrhoidalis*, by Professor N. M. Hentz, in a paper read before the American Philosophical Society of Philadelphia, on the 2d of November, 1827, and published in 1828, with a figure, in the third volume of the Transactions of the Society. It appears, however, that the same name had been previously given to another species, described, in 1823, in the second volume of Wiedemann's Magazin, and therefore Count Dejean rejected the name adopted by Professor Hentz; but in substituting another, in his catalogue, and in the fifth volume of his "Species Générales des Coléoptères," he gave it the unfortunate misnomer of *Cicindela Hentzii*. Count Dejean's description of it was drawn from a single male specimen, which he says "was sent to him by M. Leconte, who had received it of M. Hentz." The latter part of this statement contains two errors. Dejean's specimen was sent to him by Major Leconte, who received it from me as the *Cicindela hæmorrhoidalis* of Professor Hentz. The latter gentleman was well known, at least by name, to Major Leconte, who therefore can hardly be held accountable for the misnomer.

Having been the first discoverer of this rare and pretty insect, I now propose to give an account of the times and places where it has been found, and to make some observations on its habits and specific characters.

Hitherto it has been met with only on the sides and top of the Blue Hills, in Milton, Massachusetts. My first specimen was taken, on the 20th of August, 1824, in a stony path, near one of the ledges of sienite, forming a part of the Blue Hill range, and about three miles and a half in a northeasterly direction from the principal summit. As the insect rose and flew in the path before me, its red-colored abdomen was exposed, and led me at once to notice and distinguish it from the *Cicindela punctulata*, then common in other places. On dismounting from my horse, I succeeded in catching the insect by throwing my handkerchief upon it. Other specimens were sought for in vain in the same place, then and afterward. It was not till the 20th of August, 1826, that two more were taken, basking on a large flat rock, in a path leading to another part of the same range, and about one mile and a half from the top of Blue Hill. In capturing them, a rattlesnake, coiled up and concealed in a bush near the edge of

the rock, was disturbed, and one of the insects was taken within a foot of the reptile's head, just as the warning rattle was given. One of these specimens I gave to Professor Hentz to be described, and at the same time suggested the name that he adopted for it. All the rest of my specimens were taken on the top of Blue Hill, at an elevation of 710 feet above the level of the sea, and at the following times, namely, August 15, 1827; August 5 to 15, 1831; August 10, 1833; September 2, 1836; July 26, 1838; and lastly August 26, 1848, twenty-four years after the first discovery of the species. Most of all the known specimens have been captured and distributed by me. A few have been taken in the same place, by some of my entomological friends; but none have been found elsewhere to my knowledge.

Cicindela Hentzii is not plentiful, even in the places inhabited by it. It resorts chiefly to the large flat rocks, that rise but little above the surface of the soil. These rocks are thinly encrusted with lichens, intermingled with a few tufts of the long-leaved *Houstonia*, and are edged with patches of the trailing Bear-berry, and with low shrubs and scanty herbage. While resting, this Cicindela is hardly to be perceived, so well does it harmonize in hue with the lichen-covered rocks; but when it rises on the wing, it is betrayed by its motions, and by the red color of the abdomen then exposed to view, and appearing as if tinged with a drop of blood. Not unfrequently, on alighting, it begins apparently to browse on the lichens. Probably it finds there some minute insects, spiders, or acari, that serve for its food.

The rarity and limited range of *C. Hentzii* have led to the suspicion that it might be a local variety of some other species, perhaps of *C. rufiventris*. The latter, though stated by Dejean, on the authority of Palisot de Beauvais, to be a native of St. Domingo, is found in the Southern States. My specimens of the *rufiventris* were taken in North Carolina. There is no other known North American species that comes so near *Cicindela Hentzii* as this. They agree nearly in size, in the color of the abdomen, and in the number and arrangement of the white spots on the wing-covers. So too, *Cicindela repanda* and *duodecimguttata*, which are now accounted distinct and genuine species, closely resemble each other; indeed, they are more alike than *C. Hentzii* and *rufiventris*; and they were regarded by Mr. Say,

though doubtless incorrectly, as mere varieties of his *C. hirticollis*. If one of these insects in question is to be taken for a genuine species, and the other for a variety, *C. Hentzii* should be selected for the type, having all the elytral spots complete and distinct; and *C. rufiventris* for a variety, with these spots nearly effaced. If this view of the case be correct, we should expect to find, what have never yet occurred, specimens intermediate between the typical species and the variety, having the elytral spots larger and more distinct than in *C. rufiventris*, but not so fully developed as in *C. Hentzii*. From a careful comparison of many specimens of *C. Hentzii* and *C. rufiventris* together, I am inclined to think that both are genuine species. Independently of their different colors, and of the size and form of the elytral spots, they present other distinctive specific characters. The thorax of *C. Hentzii* is more nearly quadrate, and is almost straight at the sides; that of *C. rufiventris* is more contracted before and behind, and is rounded at the sides. The common punctures on the wing-covers of the latter are much larger and more distinct than those of *C. Hentzii*, while the subsutural row of ocellated punctures, which is visible even to the naked eye on each wing-cover of *C. Hentzii*, is obsolete or entirely wanting in *C. rufiventris*.

If diligently sought for, in the right season of the year, *Cicindela Hentzii* may yet be found in other parts of the United States, and especially on those hills of New England, where the rocks appear in flat tabular masses above the surface of the soil. Its discovery in these or other places would be interesting, and worthy of being made known through some scientific journal.

The color of the upper side of this insect is a very dark or obscure bronzed brown. The upper lip is whitish, with one small tooth on the edge. Each wing-cover is marked with yellowish white spots in the following manner: on the shoulder and on the tip a C-shaped spot with dilated extremities, the first often interrupted on the margin; across the middle an S-shaped band, consisting of two crescents joined by their reversed tips; on the margin behind this band an oblong spot; and near to the anterior end of the terminal C-spot a round spot. There is a row of coppery punctures near the suture, and a shorter row near the shoulder. The head is purplish blue beneath; the breast and

legs green, and clothed with a few whitish hairs. The abdomen is dull red. Length from rather more than three eighths to nearly one half of an inch.

Mr. Scudder also read a paper by the late Dr. Harris,

ON THE SYNONYMY OF THREE NORTH AMERICAN BUTTERFLIES.

There are three North American butterflies, whose nomenclature is very much confused. These are *Danais Berenice* of Cramer, *Danais Erippus* of Cramer, and *Limenitis Misippus* of Fabricius. The same species have been described under various other names, and the same names have been given to several other species, and have otherwise been misapplied. We have therefore to establish the priority of the names of these three species, and to take care that they do not conflict with the claims of other species. It becomes necessary to identify the species in question with the same as described under other names; and to distinguish them from the different species described under the same names; and lastly we have to decide what names these different species shall bear. The necessity of doing all this will appear by the following statements. The *Berenice* of Cramer is the *Erippus* of Fabricius, but not of Cramer; and it is the *Gilippus* of Smith, but not of Cramer and Fabricius. The *Erippus* of Cramer is the *Archippus* of Fabricius and of Smith, but not of Cramer; it is also the same as the *Plexippus* of Cramer, but not of Linnæus and Fabricius. The *Misippus* of Fabricius is the *Archippus* of Cramer, but not of Fabricius and Smith. The *Berenice* of Cramer is not the *Berenice* of Drury and Fabricius; the *Erippus* of Cramer is not the *Erippus* of Fabricius; and the *Misippus* of Fabricius is not the *Misippus* of Linnæus. For the sake of convenience the various specific names with which we have to deal in clearing up the nomenclature and synonymy of these species may be arranged alphabetically.

(Synonyms are italicized.)

1. Amestris, Drury = Junonia Amestris, Doubleday.
   Archippus, Cramer = Misippus, Fab.
   Archippus, Fabricius = } Erippus, Cr.
   Archippus, Smith-Abbot = }

2. Berenice, Cr.	=	Danais Berenice, Doubl.
Berenice, Dr.	=	Zingha, Cr.
Berenice, Fab.	=	
Berenice, Westwood	=	
3. Bolina, L.	=	Diadema Bolina, Westw.
Disippe, Godart	=	Misippus, Fab.
Disippus, Westw.	=	
4. Erippus, Cr.	=	Danais Erippus, Doubl.
Erippus, Fab.	=	Berenice, Cr.
5. Gilippus, Cr.	=	Danais Gilippus, Doubl.
Gilippus, Fab.	=	
Gilippus, Sm.-Ab.	=	Berenice, Cr.
6. Misippus, Fab.	=	Limenitis Misippus, nobis.
Misippus, L.	=	Bolina, L. (the female.)
7. Plexippus, L.	=	Danais Plexippus, Doubl.
Plexippus, Fab.	=	
Plexippus, Cr.	=	Erippus, Cr.
8. Zingha, Cr.	=	Nymphalis Zingha, nobis.
Zingha, Fab.	=	Amestris, Dr.

Although the *Misippus* of Fabricius and the *Archippus* of Cramer bear the same date, we may venture to give the claim of priority to Fabricius, because the dedication of his work is dated Nov. 1774. Unfortunately the name of *Archippus* must be entirely rejected. By the foregoing table it will be seen that the nomenclature of the three North American species first mentioned, has become confounded with that of five other species, all of which require to be considered and settled at the same time.

March, 1853.

Dr. Winslow exhibited some pieces of stone taken by himself from the centre of a tree at Honoaula, E. Mauii, Sandwich Islands.

The tree, called *Corea*, grows in considerable quantity on the sides of Mauna Haleekala. The wood, said to be of a character which the worms would not touch, was being sawed into sheathing for a vessel, and was said to dull the saws quickly. One tree he saw was whitish throughout, and another white on the outer parts with a red centre; from the very heart of the last he took

these stony substances, which seemed to be a sort of nucleus around which the woody rings grew; the little pipe of stone ran along the centre, in some places closely embraced by the wood for several inches, while at others a little reddish powder intervened between it and the wood. Whether it is found in all the trees he did not know. The specimens were referred to Dr. Hayes to report upon.

Dr. White presented, in the name of Mr. John H. Brazer, three specimens of *Siredon* from Cañon Lake, fourteen miles north of Great Salt Lake City, the lake being about 8,900 feet above the level of the sea. They are there believed to possess electrical powers, which is probably untrue. The thanks of the Society were voted for the donation.

Dr. C. T. Jackson read a letter from Dr. Evans, announcing the continuance of the efforts to obtain the Oregon meteorite; and alluding to the discovery of a large iron mountain in that Territory, and the occurrence of 47 per cent. of platinum in some of the black sand of the Pacific coast.

Prof. Agassiz gave a sketch of what he considered the best arrangement of a Zoölogical Museum.

In the great collections, he said, even that at the British Museum, the sole object seems hitherto to have been to exhibit animals according to their supposed natural affinities; as systems of classification vary very much, of course no harmony of arrangement can be expected on this plan. He thought something better was now wanted, and he intended to arrange the Cambridge Zoölogical Museum in a totally different manner, viz: according to natural zoölogical provinces; in this way, he hoped to be able to define such provinces, which as yet were but imperfectly known, and to arrive at important conclusions on the correlations of animals of the different classes. He intended to do the same with fossils, showing independent creations and distinct zoölogical provinces in geological as well as modern times. For purposes of

study and comparison, to this he purposed to add a very small collection of typical genera and species, exhibiting the natural affinities of animals, — also a third collection, exhibiting the embryonic series of every animal type, — a fourth, embracing the domesticated animals, to show what are species, varieties, breeds, &c., with such products from them as have a commercial value, — and finally, a museum of men, skulls, skeletons, &c., for the study of the human races.

Dr. B. J. Jeffries gave details of his experiments on frogs, alluded to at the last meeting.

In the first frog he injected 80 grains of sugar in 2 drachms of distilled water; seven hours after, by gas-light, there was no apparent cataract; it was then placed in water for twenty-two hours, after which it was taken out and died in four hours; eighteen hours after death, the lens was examined, and a small amount of cataract found on the posterior portion. In the second, the amount of sugar was doubled; it was kept from water six hours, and, no cataract appearing by gas-light, put again into water, from which it probably soon after escaped; when found about eighteen hours afterward it was very sluggish, and had by daylight strongly-marked white cataract; death took place three hours afterward, twenty-four hours after which both lenses presented cataract most strongly marked posteriorly; that portion toward and about the size of the pupil being free, giving the lenses the appearance of glass beads. In the third, 220 grains were injected; in two and a half hours cataract was present, and the motions sluggish, and by the end of the third hour death took place; twenty-four hours after death, an examination showed the same lesion as in the preceding case, only more decided; the heart was found turgid with blood. In none of these cases had the frogs natural cataract. In connection with the remarks of Dr. Williams at the last meeting, he spoke of a report in the Royal Opthalmic Hospital Journal, for January, 1859, by Mr. France, of four cases of cataract associated with diabetes, in one of which the urinary trouble was diagnosticated from the cataracts.

Mr. Theodore Lyman presented the following:—

DESCRIPTIONS OF NEW OPHIURIDÆ, BELONGING TO THE SMITHSONIAN INSTITUTION AND TO THE MUSEUM OF COMPARATIVE ZOOLOGY AT CAMBRIDGE.

AMPHIURA (Forbes).

Amphiura Pugetana, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 3.5 millim. Length of arms, 24.5 millim. Greatest width of arm, without spines, .7 millim. From outer edge of mouth-shield to outer corner of opposite mouth-slit, 1.5 millim. Mouth-shields nearly diamond shaped, the outer and side angles slightly rounded; length to breadth, .3 : .2. Under arm-plates five-sided, with the fifth angle directed inward; length to breadth, near base of arm, .5 : .4. Upper arm-plates bounded within by a strong arch, without by a slight curve; their lateral sides short; length to breadth, near base of arm, .5 : .7, — they do not quite touch each other. Scales of disc mostly rounded, smaller below than above; those above of pretty even size, with a few little ones. Arm-spines 3; sometimes 4, on joints close to disc; evenly tapering, moderately stout, of even lengths; length, near disc, .5 millim. Tentacle-scales 2, small and rounded, placed obliquely side by side. Color, in alcohol: disc, above, light greenish gray; below lighter, radial shields darker; arms, above and below, straw-color, with a faint white line, running lengthwise above.

Variations. The angles of the mouth-shields may be more or less rounded. Among younger specimens, the scales of the disc are more even in size, and the primary plates have their corners not entirely rounded off. The proportion of the arms to the disc varies somewhat, thus: diameter of disc to length of arms, as 3.5 : 24.5, 3 : 21, or 2.5 : 22.5.

This species is distinguished from others of the genus, as follows: *A. Orstedii* has the radial shields longer and separated a part of their length; 4 or 5 spines and upper arm-plates broader. *A. Puntarenæ* has rather longer arms, a small notch in the outer side of the under arm-plates, and the upper arm-plates regularly oval. *A. violacea* has mouth-shields proportionately much smaller

and the arms shorter; the color also must be quite distinct. *A. microdiscus* has, even in small specimens, the upper arm-plates touching each other and twice as broad as long. *A. tenera* has upper and lower arm-plates and mouth-shields of a different form. *A. squamata* has differently shaped mouth-shields and much shorter arms. *A. tenuis* stands very near the present species; but the arms, in specimens of the same size, are not more than half as long.

Locality, Puget Sound. Dr. Kennerly.

Smithsonian Institution, Nos. 1037, 1053, 1057.

Amphiura occidentalis, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 5.8 millim. Outer edge of mouth-shield to outer corner of opposite mouth-slit, 2.2 millim. Greatest width of arm, without spines, 1.3 millim. As the arms were somewhat broken, their length could not well be measured; but, from their proportions, they must have been at least eight times the diameter of the disc. Mouth-papillæ rounded; innermost one stoutest, and pointing to centre of mouth. Mouth-shields small, oval diamond-shaped, the angles being so rounded as to give almost a true oval; outer angle making a very slight peak; length to breadth, .4 : .5. Side mouth-shields not meeting within. Under arm-plates square oblong; angles somewhat rounded; outer side with a slightly reëntering curve; 2d plate differs from the rest, being five-sided, with its fifth angle directed inward; it is separated from the rudimentary 1st plate, by narrow prolongations of the side arm-plates. The next three or four plates are in like manner separated, while those further out on the arm are close together, which is an inversion of the usual order. Length of plates to breadth, .4 : .4. Upper arm-plates oblong, with rounded corners; outer side with a slightly reëntering curve; length to breadth, .5 : 1. Scales of disc fine, smooth, and even, above and below; primary plates distinguished by greater size. Arm-spines 3, not tapering, rather stout, rounded at the end, flattened, about as long as the joints. Two small, rounded tentacle-scales. Color, in alcohol: disc, above, faint greenish gray; arms and under surface, straw-color.

Variations. The mouth-shields may be quite oval; the 2d under arm-plate, instead of being five-sided, may resemble the rest.

This species is distinguished from *A. geminata*, by the shape of the mouth-shields and of the upper and lower arm-plates, and in having the mouth-papillæ of the same size; from *A. Chilensis*, by having two tentacle-scales, instead of one.

Locality, Monterey, Cal. Mr. Sayla.

Smithsonian Institution, No. 1054, and No. 1063 (?).

No. 1063 is from Puget Sound, and may be another species. The spines are blunter, the under scales of the disc larger and less crowded, and the under arm-plates rather more rounded. More specimens will settle the question.

Amphiura urtica, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 6 millim. Outer side of mouth-shield to outer corner of opposite mouth-slit, 2 millim. Width of arm without spines, .8 millim. Length of arms, about eleven times diameter of disc, (a specimen having a diameter of disc 5.5 millim. had 55 millim. length of arm). Mouth-papillæ rounded and bead-like. Mouth-shields nearly square, with an angle directed inward; outer angle truncated and making a slight peak; other angles slightly rounded. Length to breadth, .5 : .5. Side mouth-shields not meeting within. Upper arm-plates irregular oval, outer side less curved than inner side; length to breadth, .5 : .7. Under arm-plates scarcely touching each other; inner one five-sided, the rest nearly square, with a strong notch in the outer side; length to breadth, .4 : .4. Scales of disc fine and even; some of those near margin of disc bearing very fine prickles on their edges. Primary plates not conspicuous. Arm-spines 3, about as long as the joints, delicate, sharp, regularly tapering. Tentacle-scales 2, both of them small and delicate. Color, in alcohol: upper and under surface of disc dark greenish gray, with a margin of light; arms light straw-color.

Variations. The mouth-shields vary in shape to an unusual degree; sometimes they have a strong peak without, and again none at all; they may be nearly rectangular, or almost oval, and some are not far from round. The under arm-plates may be more or less pentagonal; but, in the adult, most of them are nearly square. The young, with a disc 2.5 millim. in diameter, have the under arm-plates pentagonal, with a deep notch in their outer side, and separated by the side arm-plates; they have also,

on the back of the disc, a conspicuous rosette of round, primary scales.

This species differs from *A. occidentalis*, in its notched under arm-plates, sharp spines, and prickly scales of the disc. It is a somewhat aberrant species, and by its prickly scales approaches *Amphiura scabriuscula*.

Locality, Puget Sound. Dr. Kennerly.

Smithsonian Institution, No. 1041.

Amphiura Wurdemanii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 9.5 millim. From outer edge of mouth-shield to outer corner of opposite mouth-slit, 3.5 millim. Width of arm, without spines, 2.2 millim. Arms remarkably flat, wide, and little tapering; as they were broken, the length could not be known, but it seemed not less than ten times the diameter of the disc. Teeth broad and flat, with free edge a little curved. Mouth-papillæ 3 on each side, rounded and bead-like; innermost one placed below the teeth, and running somewhat upward. Mouth-shields shaped something like the sole of a shoe, very long and narrow, small, with their outer end rounded, and their inner one a rounded point, wider within than without; length to breadth, .8 : .5. Side mouth-shields almost as large as mouth-shields proper, broader without than within, somewhat curved. Under arm-plates squarish, rather broader than long, overlapping each other a little; outer side bounded by a slightly reëntering curve, corners rounded; length to breadth, (13th plate,) .5 : .7. Upper arm-plates very short and broad, overlapping, bounded without by a reëntering curve; outer corners strongly rounded, length to breadth, .4 : 1.7; they are occasionally broken in two. Scales of disc fine, of pretty even size, rather thicker than are usually found in the genus; those below somewhat finer; around edge of disc, a little fence of small, flat, narrow scales, or papillæ, standing upright; this fence is interrupted opposite the radial shields. Radial shields broad, blunt, pear-seed shaped, sometimes separated by a wedge of three or four scales, sometimes joined by their sides; length to breadth, 2 : 1. Arm-spines 3, short, stout, broad, rounded at the end, somewhat flattened, a little longer than joints, nearly alike in shape and size. Tentacle-scales 2, short, broad, and thin, with curved edges.

Color, in alcohol: above, disc nearly white; arms straw-color, with irregular bands of dark brown; below, arms straw-color, interbrachial spaces white, mouth-shields brown.

This species belongs with those *Amphiuræ* that have the upper row of the lower scales of the disc strongly developed and standing upright, thus making a sort of fence. It differs from *A. septa*, in the shape of the mouth-shields, and in wanting spines on the upper surface of the disc; from *A. marginata*, in the irregular arrangement of the disc-scales, the different proportions of the arm-plates, &c.

Locality, Captiva Key, Charlotte's Harbor, Florida. Mr. Wurdeman.

Museum of Comparative Zoölogy, Cambridge.

OPHIOGLYPHA, (Lyman.)

Ὄφις. γλυφὴ (notch).

Synonyme: *Ophiura*, (Forbes, non Lamk.)

The genus *Ophiura*, as defined by Forbes and as used by Dr. Lütken, cannot stand. Dr. Lütken himself points out the fact, that Lamarck, in his first edition of "Système des Animaux sans Vertèbres," (1801,) took, as the type of his genus *Ophiura*, *Asterias longicauda*, (Linck.) which is *Ophioderma longicauda*, (Müll. & Trosch.) *Ophiura*, then, is the proper generic name for *Ophioderma*, and *Ophioderma* must be dropped. It becomes therefore necessary to give a new name to the genus called *Ophiura* by Forbes, and I propose that of *Ophioglypha*.

Ophioglypha Lütkenii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of the disc, 18 millim. Outer edge of mouth-shield to outer corner of opposite mouth-slit, 8.5 millim. Width of arm, without spines, 3.5 millim. Length of arm, 90 millim. Mouth-papillæ like thorns; a bunch of about ten at the point of the jaw, and two or three scattered ones, on each side, placed above the scales of innermost pair of tentacle-pores. Teeth about 9; long, narrow, flat, rather sharp, arranged sometimes in single, sometimes in double rows. Mouth-shields shield-shaped, with an angle turned inward, and outer side rounded; lateral corners somewhat projecting; length to breadth, 3 : 3. Under arm-plates, at base of arm, broad, triangular, with

lateral corners somewhat rounded; length to breadth, 1 : 2.5. Further out on arm, the plates, as is usual in the genus, grow smaller and smaller, from being encroached on by the side arm-plates. Upper arm-plates much broader than long, and having the outer and inner sides straight and parallel; length to breadth, near base of arm, 1.2 : 3.5. Scales of disc, above and below, not arched or swelled, but lying very flat and evenly; primary plates rounded, and conspicuous by their size. Notches in disc, at base of arms, deep, admitting fully four arm-plates. Comb on the edges of each notch made up of thick, flat, spreading papillæ, crowded side by side, in a continuous line. These papillæ are only 6 or 7; they decrease in length as they pass under the disc, where they join the narrow, toothed edge that runs along the margin of each genital slit. On base of arm proper, no comb, or line of papillæ. Arm-spines 3, tapering, sharp; upper one longest, and equal to about 1½ joints; lowest one shortest, and equal to a little less than one joint. Tentacle-scales of innermost pair of pores short, stout, crowded, flattened; usually 4 or 5 on outer side, and 4, somewhat smaller, on inner side, of each pore. Rest of tentacles with only one round and rather thick scale, but there may also be a little tooth, just outside the tentacle. Color, in alcohol: above, bluish gray, (a sort of clay-color,) with darker markings; the arms the same, with darker bands; below, arms whitish; interbrachial spaces of a purplish hue, with white spots.

This species is nearest *O. Sarsii*, but differs in the want of a row of papillæ on the base of the arm, above; in having the papillæ of the arm-comb and of the inner pair of tentacle-pores more crowded and blunter; in the finer and sharper mouth-papillæ, &c.

Locality, Puget Sound. Dr. Kennerly.

Smithsonian Institution, No. 1039.

There are also, in the Smithsonian collection, specimens from Puget Sound, which closely resemble the young of *O. Sarsii*; but, as they are not very well preserved, they must remain for the present in doubt.

OPHIURA, (Lamk. non Forbes.)

Ophioderma, (Müll. & Trosch.) *Ophiura teres*, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 82 millim.

Outer edge of mouth-shield to outer corner of opposite mouth-slit, 12 millim. Width of arm, without spines, 7 millim. Length of arm, 133 millim. Mouth-papillæ, about 18 to each angle of mouth, small, tooth-like, somewhat crowded, the innermost, and the outermost but one, on each side, broader and larger than their neighbors. Teeth broad, flat, short, with the free edge curved, the upper ones more pointed. Mouth-shields very broad heart-shape, usually presenting three rounded lobes, of which one is directed inward; length to breadth, 2.5 : 3.5. Side mouth-shields covered by granulation of disc. Under arm-plates small, squarish, bounded without by three sides, with much rounded angles, and within by a slightly curved line; length to breadth, (13th plate,) 1.5 : 2. The first five plates are smaller and narrower; and, between the 1st and 2d, 2d and 3d, and 3d and 4th, there is a pair of pores. Upper arm-plates very short and wide; length to breadth, 1.7 : 6.5. All the plates, except those just at the tip of the arm, are broken in irregular pieces; those near base of arm usually in 5; those near its tip, in 3, or 4; so that the upper surface seems covered with an irregular mosaic. Granulation of disc fine and even, covering radial shields and the whole disc, above and below; near base of arms, above, are sometimes one or two little naked plates of variable size. Arm-spines short, flat, tapering, rather stout, nine in number; three lowest ones rather longer than the rest, and lowest one longest of all; upper ones about half as long as side arm-plates. Two tentacle-scales, longer than broad, flattened, outside one rather shorter and cut off more square at the end. Color, in alcohol: above, purplish brown, with upper arm-plates closely speckled with lighter; below, chewing apparatus, lowest arm-spines, and under arm-plates yellowish white; the rest purplish brown.

Variations. The mouth-shields may differ somewhat in shape; and the under arm-plates may be light brown.

This species at once strikes the eye by its short, rounded arms, covered above by a multitude of irregular pieces. It is distinguished from *O. Panamensis*, by broken arm-plates, proportionately shorter arms, and absence of radial shields; from *O. variegata*, by proportionately shorter arms, granulated side mouth-shields, &c. It most resembles the dark variety of *O. cinerea* (*O. Antillarum*, Ltk.) of the West Indies, but differs in having shorter arms and covered radial shields.

Locality, Panama. Rev. T. Powell.

Smithsonian Institution, No. 1051.

There is a specimen in the Smithsonian Institution (No. 1055) which may be the young of this species; it has the arms somewhat longer, however, in proportion, and the pattern of the color is quite different; the mouth-shields also are more rounded. It is from Panama.

OPHIOPHOLIS, (Müll. & Trosch.)

Ophiopholis Kennerlyi, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 8 millim. Outer edge of mouth-shield to outer corner of opposite mouth-slit, 3.4 millim. Width of arm, without spines, 2 millim. Length of arm, 35.3 millim. Mouth-papillæ thin, flat, square, with corners rounded; three on each side. Teeth short, broad, square, stout. Mouth-shields very closely soldered with side mouth-shields; rather small, nearly oval; length to breadth, .7 : 1. Under arm-plates nearly square, corners a little rounded, and outer side bounded by a slightly reëntering curve; length to breadth, 1 : 1. Side arm-plates small, and little prominent. Upper arm-plates irregular oval, sometimes broken in two, more or less encroached on by supplementary pieces, which bound their outer and lateral sides; length to breadth, near base of arm, .8 : 1.5. The supplementary pieces form a close line; they are thick and angular, vary somewhat in size, and, near base of arm, from seven to ten in number; further out, fewer; and, near the tip, none at all. Disc, above, closely and evenly covered with round grains, among which appear a few small, round, primary plates; one in centre and one or two in each brachial space; none at all in the interbrachial spaces; diameter of central plate, .7 millim. Disc, below, closely set with short, stout, smooth spines, about .3 millim. long. Arm-spines very stout, short, thick, rounded; the longest about length of arm-joints; lowest one much the shortest, blunt, conical; 2d spine same shape, but longer; 3d and 4th longest, broad, thick, and blunt; 5th same shape, but shorter; usually 5 spines, sometimes, close to disc, 6; near tip of arm the lower spine has the form of a double hook. Color, in alcohol: purplish pink, with obscure bands of a darker shade on arms; an obscure line of whitish running lengthwise of the arms; in the position of

each radial shield, an irregular patch of white; below, interbrachial spaces mottled, reddish and white; mouth-apparatus whitish; lower arm-plates whitish, edged with pink; other parts same as upper surface, but lighter.

Variations. A specimen of about the same size as the preceding, had usually three, instead of two, primary plates in each brachial space on the upper surface of the disc, also a distinct line of white, running quite round the disc, near its edge. A young one, with a disc 3 millim. in diameter, had arms 12.5 millim. in length. The arm-spines were more slender, and were thorny, as were also the spines and grains of the disc. In the centre of the disc a patch of white, and another at the base of each arm.

This species is interesting, as being the second of a genus which before had but one member. It is distinguished from *O. aculeata*, by the close and regular granulation of the disc, without spines above, and by having no primary plates in the *inter*brachial spaces. It seems, also, to be a much smaller species.

Locality, Puget Sound. Dr. Kennerly.

Smithsonian Institution, No. 1062.

OPHIOTHRIX, (Müll. & Trosch.)

Ophiothrix lineata, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 10 millim. From outer edge of mouth-shield to outer corner of opposite mouth-slit, 4.5 millim. Width of arm, without spines, 2 millim. Length of arm, 63 millim. Tooth-papillæ fine, numerous, cylindrical, resembling short, blunt spines. Mouth-shields broad oval, with a slight peak toward mouth; length to breadth, 1 : 1.5. Disc, above, with large radial shields, which are smooth, or very nearly so, shaped like an elongated triangle, the acute angle being turned inward, separated by a distinct stripe; length to breadth, 2.8 : 1.7; the narrow brachial and broad interbrachial spaces form ten stripes, radiating from the centre; both centre and stripes are covered with elongated scales, (only to be seen on dried specimens,) and these, again, bear many little grains, each with a crown of thorns; below, interbrachial spaces quite naked. Upper arm-plates broad hexagonal, with corners a little rounded, the two side angles more acute than the others; length to breadth, .7 : 1.5. Under arm-plates nearly oval, but with some

indications of angles; length to breadth, .8 : 1.2. Arm-spines rather stout, flattened, cut off square at the end, varying in length; about six in number on joints close to disc; two upper ones much the stoutest and longest, and of about equal length, viz: 2.7 millim.; sometimes, however, the upper one is very short and stout; three lowest spines minute and slender, the longest not longer than .8 millim.; a little further out on arm only five spines, two large, one medium, and two small. The large spines have, on their flat sides, diagonal rows of smooth, microscopic tubercles, which give them a wavy, or corrugated appearance. One tentacle-scale, represented by a microscopic thorn. Color, in alcohol: above, disc uniform, light, Indian red; arms dull purplish, with a very distinct longitudinal line of black, bounded on each side by a clear white line; spines glassy, with a pink hue; below, mouth-apparatus and under arm-plates white; interbrachial spaces Indian red without, but yellowish toward the mouth.

Variations. The number of spines sometimes rises to nine, of which five are large and four very small. The mouth-shields, instead of being regularly oval, may have their lateral corners quite sharp.

This species may be readily distinguished from all others of Florida, by the granulation of the disc, the character of the spines, and the regular form of the upper arm-plates.

Locality, east coast of Florida. Prof. Agassiz.

Museum of Comparative Zoölogy, Cambridge.

CORRECTIONS IN THE NOMENCLATURE OF OPHIURIDÆ.

No one has yet been able to identify Say's *Ophiura appressa*. It is evidently a true *Ophiura*, (*Ophioderma*, M. & T.) but the question is, which species? *O. serpens*, *guttata*, *brevicauda*, and *variegata* disagree with Say's description, in having all the arm-spines of *equal* length. *O. cinerea* (*Antillarum*, Ltk.) has radial shields, and has the upper arm-plates broken. *O. rubicunda* disagrees in having radial shields, and in color. *O. squamosissima* differs in its peculiar scaly arms. Finally, *O. elaps* disagrees in the number and form of its spines. No species remains but *O. virescens*, described by Dr. Lütken, and this is doubtless the species previously described by Say; first, because the *gray* variety agrees perfectly with Say's description; second, because it is

abundant on the coast of Florida; and third, because it is *not* any of the known Florida or West Indian species. *Ophioderma virescens* (Ltk.) should therefore be written *Ophiura appressa*, (Say.)

Ophioderma Antillarum (Ltk.) agrees with Müller and Troschel's description of *Ophioderma cinereum, if the same sized* animals be compared; and *O. cinereum* does not agree with any other known member of the genus. Unless, therefore, a direct comparison of the original specimen in the Vienna Museum gives a different result, *cinereum* must take the precedence, and the name must be written *Ophiura cinerea.*

Asterias cordifera (Bosc) is considered by Dr. Lütken as identical with a species from the West Indies, described by him as *Amphiura cordifera.* This cannot well be. *Amphiura cordifera* (Ltk.) is not found at all in Carolina, where Bosc described his *Asterias* as common. A slight comparison of the descriptions will show that Lütken's Ophiuran disagrees with that of Bosc, in the length of the arms, form of the disc-scales, separation of the radial shields, &c. On the other hand, it is plain that *Asterias cordifera* is *Ophiura elongata* (Say); for this species, therefore, the name *Amphiura cordifera* must be reserved, and a new specific name given to *Amphiura cordifera*, (Ltk.)

Ophionereis triloba (Ltk.) is the same as *Ophiolepis annulata*, (Le Conte.) It should therefore be written *Ophionereis annulata.* Dr. Le Conte mistook one tentacle-scale for two.

Concerning the Ophiuran faunæ that characterize the western coasts of Europe and of North America, and the eastern coast of North America, including the West Indies, not enough is known to give fully reliable information. But some characteristic limits may, nevertheless, be pointed out. Starting with the northern seas of Europe, north of 50°, we find several species, such as *Ophiopholis aculeata, Ophioglypha Sarsii*, and *Ophiacantha spinulosa*, that pass northward and westward, through the cold temperate and frigid regions, and then follow the coasts of Greenland and America southward, reaching nearly to lat. 40°, or about 10° further south than they appear on the European coast. On the other hand, there are species, such as *Amphiura filiformis* and *A. brachiata*, that do not pass to the American shores; and others, such as *Amphiura tenuis* and *Ophiolepis* (?) *robusta*, (Ayres,)

that do not pass to the European shores. Thus, there are two faunæ, quite distinct in some species, but having others also in common, that pass from one to the other, through the Arctic seas. Crossing now the American continent, we find, near lat. 50°, the familiar forms of an *Ophiopholis*, very like *Ophiopholis aculeata*, and an *Amphiura* closely resembling *A. tenuis;* there is still further an *Ophioglypha* which at once recalls *O. Sarsii;* yet all these are distinct species, illustrating faunæ of a similar character. Returning now to the east coast, and passing south of Cape Cod, lat. 42°, we come on new species and leave the others behind. Here is seen the genus *Ophiura*, (*O. olivacea*,) an adventurous traveller from more southern waters. At Charleston, near lat. 32°, a set of species quite novel again surprises the naturalist; here are *Ophiothrix angulata*, *Amphiura cordifera*, and the slender-armed *Amphiura gracillima*. This group has some analogy to that found in the southern Mediterranean, but the resemblances are faint, and no longer strike us like those of the northern faunæ. Still going southward, the fauna again changes, and near Cape Florida, lat. 26°, the animal world of the Gulf of Mexico and the Antilles opens upon us, with all its richness. Here are the characteristic *Ophiocoma crassispina*, *Ophiura appressa*, *Ophiopsila Rusei*, *Ophiothrix Orstedii*, and many others. In Central America, crossing the few miles of land that separate the two great oceans, we are surprised to find an Ophiuran fauna, the counterpart of that of the Gulf; a fauna that is wonderful for its close similarity and for its invariable difference. An unpractised eye might well confound *Ophionereis reticulata* with *O. annulata*, *Ophiocoma crassispina* with *O. Ethiops*, and *Ophiothrix violacea* with *O. spiculata*. Of the coast of California not enough is known to make any comparisons.

In reference to this paper, Prof. Agassiz made some remarks on the principle which he thought ought to govern zoölogical nomenclature; viz: that each species should be indicated, not necessarily by the name of the first describer of the species nor by that of the one who established the true genus, but by his who combines originally or afterward the true generic and specific

names. He instanced *Melolontha vulgaris*, (Linn.) *Cossus ligniperda*, (Fabr.) and *Ophiura longicauda*, (Lyman.)

Dr. John Evans, of Washington, D. C., was chosen a Corresponding Member, and Messrs. A. E. Verrill, E. S. Morse, and J. L. Foley, of Cambridge; Edward S. Ritchie, of Brookline; William Edwards, of South Natick; and J. Brooks Taft, of Boston; Resident Members.

DONATIONS TO THE MUSEUM.

October 5. Thirty microscopic slides from E. Samuels. *Chætodon* from the Sandwich Islands; by Dr. C. F. Winslow. Large specimen of stalactite from the Mammoth Cave, Kentucky; by Alvin Adams, Esq.

October 19. Fishes from Sandwich Islands, among them *Goniobatis meleagris*, (Ag.); two specimens of the crustacean genus *Ranina*, and a cuttle fish, from the same locality; by Dr. C. F. Winslow. *Odontaspis griseus*, from Massachusetts Bay; by Dr. D. H. Storer. Two snakes and a skink, locality unknown; by Mr. James Walker, of Charlestown.

November 2. Specimen of *Sigillaria obovata?* from the Joggins, Nova Scotia; by Prof. W. B. Rogers. Bottle of sand thrown up from the volcano of Fuego in Central America in 1855, and a piece of vegetable wax from that region; by Mr. J. M. Barnard. The heart of a *Boa constrictor*, from South America; by Mr. J. W. P. Jenks. *Vespertilio pruinosus*, Massachusetts; by C. J. Sprague.

November 16. A *Tetraodon* from the Sandwich Islands; by Dr. C. F. Winslow. Radiates, Ascidians, and other marine specimens, from Eastport, Me.; by Lieut. Miller. *Spermophilus tridecimlineatus*, and *Erismatura rubida*, from Illinois; by Mr. Samuel Clark, of Chicago.

December 7. *Lophius piscatorius*, from Massachusetts Bay; by J. A. Cutting. An *Ostracion*, and shells from the Sandwich Islands; a California quail, and mass of adipocire from the Pacific Ocean; by Dr. C. F. Winslow. An upper molar tooth of the Asiatic elephant, and a bottle of snakes and insects from the Cape of Good Hope; by Mr. James Walker, of Charlestown.

December 21. Half section of a diseased tooth of a sperm whale; by Mr. George H. Folger. Several specimens of snakes, *Anableps*, and *Didelphis*, from Surinam; by Dr. C. H. Hildreth, of Gloucester. Small crustacean from Sandwich Islands; by Dr. C. F. Winslow. Three specimens of *Siredon*, from vicinity of Great Salt Lake; by Mr. John H. Brazer.

BOOKS RECEIVED DURING THE QUARTER ENDING DEC. 31, 1859.

About Grasshoppers and Locusts. By Alex. S. Taylor. Fol. Pamph. Monterey, Cal. *From the Author.*

The Oxford Museum. By H. W. Acland, M. D., and John Ruskin, M. A. 12mo. London. *From S. H. Scudder.*

Preliminary Report on the Geology of Vermont. By Ed. Hitchcock. 8vo. Pamph. Montpelier, 1859. *From G. F. Houghton.*

Life of John C. Warren, M. D. By Edward Warren, M. D. 2 vols. 8vo. Boston, 1860. *From J. M. Warren, M. D.*

Observations on the Genus Unio. By Isaac Lea. 4to. Pamph. Philadelphia. Vol. 7, Part 1, of the Philosophical Society's Transactions. *From the Author.*

Catalogue of the Public Library, New Bedford, Mass. 8vo. 1858. *From the Trustees.*

Edinburgh New Philosophical Journal. Vol. X. No. 1. *From Prof. H. B. Rogers.*

Descriptions of Salmonidæ, from the Northwest Coast of North America. By G. Suckley, M. D. 8vo. Pamph. *From the Author.*

Geological Report of the Southwest Branch of the Pacific Railroad of Missouri. By G. C. Swallow. 8vo. St. Louis, 1859. *From the Author.*

Notes on Figures of Japanese Fish. By J. C. Brevoort. 4to. New York, 1858. *From the Author.*

Dyas et Trias, ou le Nouveau Grès Rouge en Europe. Par J. Marcou. 8vo. Pamph. Genève. *From the Author.*

Geological Sketch of the Estuary, &c., of Judith River. By F. V. Hayden. Also, Extinct Vertebrata from Judith River and Great Lignite Formations of Nebraska. By Joseph Leidy. 4to. Pamph. Philadelphia, 1859. *From Joseph Leidy.*

Mémoires et Documents, publiés par la Société Historique de Montreal. 2de Livraison. 1859.

Journal de l'Instruction Publique. Vol. 3. Nos. 1–8. Pamph. Montreal, 1859.

Journal of Education. Nos. 1–8. Vol. 3. 4to. Pamph. Montreal. *From Capt. L. A. H. Latour.*

Remarks on Lepas anatifera, Linn. By G. Lawson, P. D. 8vo. Pamph.

On the occurrence of Cinchonaceous Glands in Galiaceæ, &c. By the Same. 8vo. Pamph.

Papers read to the Botanical Society of Edinburgh. By the Same. 8vo. Pamph. *From the Author.*

Transactions of the Academy of Natural Sciences of St. Louis. Vol. I. No. 3. 8vo. Pamph. 1859.

Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome 4. 2ième et 3ième Cahiers. 8vo. Pamph. 1858.

Recueil des Actes de l'Académie Impériale des Sciences, &c., de Bordeaux. 20ième année. 8vo. 1858. 4me Trimestre.

Zeitschrift für die Gesammten Naturwissenschaften. Jahrgang, 1858. Zwölfter Band. 8vo. Berlin, 1858.

Verhandlungen der K. Zoölogisch-Botanischen Gesellschaft in Wien. 8vo. Jahrgang, 1858.

Report of Proceedings of Geological and Polytechnic Society of West Riding of Yorkshire. 8vo. Pamph. 1858-9. Leeds.

Leeds Philosophical and Literary Society Annual Report for 1858-9. 8vo. Pamph. Leeds.

Jahresbericht der Naturforschenden Gesellschaft in Emden, 1858. 8vo. Pamph. 1859.

Verhandlungen der Vereins zur Beförderung des Gartenbaues in den König. Preussischen Staaten. 8 Nos. Jan. 1856 to Dec. 1858. Berlin.

Jahrbuch der K.-K. Geologischen Reichsanstalt. IX. Jahrgang. No. 4. Oct. — Dec. 1858. X. Jahrgang. No. 1. 1859. Wien.

Proceedings of the Literary and Philosophical Society of Liverpool.

Wiegmann Archiv für Naturgeschichte. Nos. 5 and 6, 1858. 1 and 2, 1859. Berlin.

Journal of the Royal Geographical Society. Vol. 28. London, 1858.

Proceedings of the Same. Vol. III. Nos. 4 and 5. 1859.

Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westphalens. Vierzehnter Jahrgang. Nos. 5–11. Fünfzehnter Jahrgang. Nos. 1–29. 8vo. Bonn, 1857–8.

Recueil des Actes de l'Académie Impériale des Sciences, &c. 21ème année. 1859. 8vo. Pamph. Paris.

Journal of the Academy of Natural Sciences of Philadelphia. New Series. Vol. IV. Part 2. 4to. 1859.

Proceedings of the Same. Sigs. 15–21. 8vo. Pamph. 1859.

Transactions of the American Philosophical Society. Vol. XII. Part 2. 4to. Philadelphia, 1859.

New York Journal of Medicine. No. 99, for November, 1859.

Canadian Journal of Industry, Science, and Art. Nos. 23, for September, and 24, for November, 1859. Toronto.

Canadian Naturalist and Geologist. Vol. IV. No. 5, for October, 1859.

Proceedings of the Zoölogical Society of London. Part 26, 1858, and Parts 1 and 2, 1859.

Silliman's American Journal of Science and Arts. No. 84. November, 1859.

Annual Report of the Regents of the Smithsonian Institution. 8vo. Washington, 1859. *Received in Exchange.*

Annals and Magazine of Natural History. Vol. IV. Nos. 22, 23, and 24. London, 1859. *From the Courtis Fund.*

Orr's Circle of the Sciences. 9 Vols. 12mo. London, 1854–56.

Reminiscences of Rufus Choate. By Edward G. Parker. 12mo. New York, 1860.

Home and Abroad. By Bayard Taylor. 12mo. 1859.

Twelve Years of a Soldier's Life in India. By Major W. S. R. Hodson. 12mo. Boston, 1860.

Life of Andrew Jackson. By James Parton. Vol. 1. 8vo. New York.

History of Civilization in England. By H. T. Buckle. Vol. 1. 8vo. New York, 1859.

History of the Life and Times of James Madison. By Wm. C. Rives. 8vo. Vol. 1. Boston, 1859.

Recollections of Samuel Rogers. 12mo. Boston, 1859.

History of Methodism. By Abel Stevens, LL.D. 2 vols. 12mo. New York, 1859.

Life of John Milton. By David Masson. Vol. 1. 8vo. Boston, 1859.

Fiji and the Fijians. By T. Williams and J. Clarke. 8vo. New York, 1859.

Forty-four Years of the Life of a Hunter. 12mo. New York, 1859.

Travels in Greece and Russia. By Bayard Taylor. 12mo. New York, 1859.

Thirty Years in the Arctic Regions; or the Adventures of Sir John Franklin. 12mo. New York. *Deposited by the Republican Institution.*

January 4, 1860.

The President in the Chair.

Mr. Edward Hitchcock, Jr., of Amherst, made a communication on the elongated, flattened, and curved pebbles found in the conglomerate of Vermont.

Similar ones were first noticed in the Newport, R. I. conglomerate, where they are found parallel to each other and parallel to the strike. In E. Wallingford and Fairfax, Vt., they are found in a quartz conglomerate, the cementing material being sandstone or talcose schist.

Their origin he considered involved in obscurity; he thought, however, that the distortion must have been effected since their deposition, and while they were in a plastic state; he was at a loss also to explain the frequent occurrence of jointed planes. Chemical and electrical causes had been hinted at by his father, Prof. Hitchcock. The occurrence of crystals of magnetic iron gives evidence of a considerable and moist heat; there is in Vermont no evidence of a trap dyke or other igneous agency within a few miles of their locality, and the influence of the former would have been confined to a few feet on either side.