

- 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.

Dr. C. T. Jackson thought that the smoothness and absence of indentation showed that no change had taken place in the forms since their deposition; they are perfectly polished, as in the stones rolled upon our shingle beaches by the powerful action of the surf; this constant grinding, and rolling up and down, by the force of the waves, would produce various cylindrical forms, and even the crooked and distorted ones exhibited on the diagrams of Mr. Hitchcock; and similar shapes can be seen any day upon the present beaches. Beside, quartz pebbles could hardly have been softened by heat, and, if they were, would have taken different forms from these. The magnetic iron he considered the result of a metalliferous emanation, rising in vapor, as in almost every volcanic eruption, and requiring less than a red heat. They were parallel to each other and to the line of the strata, because they were thus formed originally. In presence of sea-water, a moderate heat would be sufficient to cause the pebbles to be united by a cement of Wollastonite or silicate of lime. He was averse to any theory of their explanation which requires softening after their deposition.

Dr. A. A. Hayes gave the following, as the result of his examination of the mineral substance, found by Dr. C. F. Winslow, occupying the medullary cavity of trees growing in the Sandwich Islands. (See page 190 of the present volume.)

Physical characters. This matter occurs in the form of hollow and sometimes solid, cylinders, about one fourth of an inch in diameter. Small lateral holes are found opening into and through the cylinders; and the color, externally brown, is yellowish gray when freshly fractured.

The hardness is greater than calc-spar or dolomite, and nearly that of fluor-spar. Specific gravity 2.414, and general appearance that of imitative forms of brown iron ore.

Analysis. Boiling distilled water dissolves an organic salt of lime, and the solution has a strong earthy odor.

Carbonate of soda solution takes up crenic and humic acids. There are no other acids or bases present. 100 parts consist of

Organic acids and moisture	14.46
Carbonate of lime	72.82
Magnesia as a base	7.32
Biphosphate of magnesia	2.20
	<hr/>
	96.80

A little silica, and a mere trace of carbonate of iron, were detected. The brown color of the surface is produced by humus; and associated with the humic acid and the biphosphate of magnesia is some ammonia, forming a humate of ammonia in the organic part, and double phosphate of ammonia and magnesia in the mineral part.

The carbonic acid is insufficient in quantity to engage both the magnesia and lime, I have therefore regarded the condition of the lime as a carbonate, and the magnesia as in union with crenic and humic acids.

The composition of this substance indicates that crenates of lime and magnesia, and some ammonia phosphate of magnesia, were absorbed from the soil; and in the subsequent decomposition the carbonate of lime formed was rendered more compact and hard by the portion of crenate, which is undecomposed, acting as a cement. The humus and humic acids are the usual attendants of this decomposition.

Although stony matter occurring in trees has been frequently mentioned, the information possessed on the subject had led me to suppose that the mineral part occupied the space near the concentric rings which the section of a tree presents, and not the medullary canal, as in this instance.

Mr. Dillaway, the Librarian, announced the reception of the scientific portion of the library of the late Dr. T. W. Harris, consisting of about 250 volumes, especially rich in the department of Entomology. This valuable donation is due to the liberality of John P. Cushing, Esq., of Watertown, who was also the largest contributor for the purchase of the Harris Cabinet of Insects and Manuscripts, also the property of the Society. The thanks of the Society were voted to Mr. Cushing for this

valuable donation. It was also voted that these collections be henceforth known in the Society's halls as the Harris Cabinet and the Harris Library, and be kept separate from the general cabinet and library.

Mr. Scudder, Curator of Entomology, observed that among the volumes was one containing all the rarer tracts of Say, most of which are extremely scarce; among them his *New Harmony* pamphlets, one of which (on the Heteropterous Hemiptera of North America) is probably the only copy in this country, if indeed it can be found anywhere else. There is a volume of colored drawings by John Abbot, of the Lepidoptera and Coleoptera of Georgia, presented to Dr. Harris by Edward Doubleday, Esq., of England, containing all the originals of the drawings in "Abbot and Smith's rarer Lepidopterous Insects of Georgia," beside many others yet unpublished. Most of the important European works are here, — such as those of Fabricius, Herbst, Dejean, Boisduval, Macquart, Wiedemann, Audinet-Serville, Sahlberg, Coquebert, Schonherr, Gory and Percheron, Aubé, Laporte and Gory, Westwood, Knoch's "Neue Beytrage," and the "Wiener Verzeichniss;" together with nearly complete sets of most of the publications of entomological societies and entomological periodicals. Some of these are from the library of Mr. Say, and contain a few of his notes; many were once possessed by Prof. Peck, the predecessor of Dr. Harris, and one is from the library of Dru Drury; and nearly all are enriched by copious notes of Dr. Harris.

The President gave an account of the Gorilla collection of Mr. Du Chaillu, in New York, made during a residence of three or four years in the country of this largest anthropoid ape, which includes about ten degrees on each side of the equator on the west coast of Africa.

Though affording nothing new in regard to the skeleton, the collection was interesting from containing an extensive series from the quite young to the adult animal. Though the females are said to be the most numerous, ten out of fourteen specimens examined have been males. The cranial capacity ranges in the males from 24 to 34½ cubic inches, the average being 28 or 29;

the weight of the animal being more than that of man, the relative size of the brain is very small; in the lowest human races the cranial capacity is about 75 cubic inches, and the weight of the body about 150 lbs. The variation in the size of the brain is probably accompanied by a considerable variation in intelligence; in many of the lower mammals (as the carnivora) a similar range of variation is observable. There were one or two new chimpanzee-like animals in this collection. In one female adult skull, with a capacity of only 19 cubic inches, the teeth were in a continuous series as in man, whereas in all the anthropoid monkeys there is normally an interval between the upper incisors and canines for the reception of the lower canines; this skull was otherwise abnormal, and in man would be considered idiotic; he regarded this condition as entirely exceptional, and the result of irregular and abnormal development of the jaws from some cause.

In a young gorilla which he had examined, the first dentition was completed and partially shed, but yet the intermaxillary bones were quite distinct; in the chimpanzee they disappear as separate bones during the first dentition, but much later in the gorilla, which in this respect is lower than the former. In the young gorilla, as in other anthropoid apes, there is no indentation of the body at the waist; the back also forms a regular curve, as in the human foetus or new-born child; this form is less noticeable in the chimpanzee than in the gorilla. The body of the gorilla is more embryonic than that of other animals in this respect, showing that one part may remain embryonic while others go on in development. The legs are short in comparison with the trunk. In the young gorilla the forehead is well formed, and the anterior cerebral lobes are *over* instead of *behind* the orbit, the latter being the case in the adult. The ear comes nearest to the human ear, in its helix, antihelix, tragus, antitragus, and lobule; in the descending scale, the lobule first disappears, and then the top becomes pointed. In the hands the first phalangeal row is involved in the web; in his specimen the toes also were webbed. The muscles are considerably modified from the human, and some new ones are found; in man the hands are only prehensile and tactile, and the feet locomotive; in apes the arms also become locomotive, and less tactile and prehensory. The *deltoid* goes lower down in gorilla than in man, and a lower portion goes to

join the *brachialis anticus*, and thus becomes a flexor of the ulna ; in the lower mammals the *deltoid* goes still farther down, and acts powerfully in flexing the forearm ; in this respect the gorilla is lower than the chimpanzee. The *pectoralis minor* consists of two portions, one going to the coracoid process and the other joining the tendon of the *biceps* ; the *subclavius* goes to the coracoid process instead of the clavicle, a condition which sometimes exists as an anomaly in man. In the *latissimus dorsi* the gorilla is higher than the chimpanzee, as in the latter there is a slip which extends to the end of the ulna, which was not found in the gorilla he examined ; the *serratus magnus* pulls the scapula down. The *gluteus maximus* is smaller than the *medius*, and is inserted into the outer condyle as well as the upper part of the femur ; the flexors of the leg are attached one third of the way down the limb, so that the legs cannot be entirely straightened. Most of the muscles of the human hand are found in the gorilla ; but the thumb is supplied by a slip from the common flexor, having no independent long flexor. There are two additional adductors of the thigh, which carry this part much more powerfully inward in the act of climbing.

Messrs. Theodore N. Gill, of Brooklyn, N. Y., and A. S. Packard, Jr., of Brunswick, Me., were chosen Corresponding Members ; and Dr. D. D. Slade, Samuel Wells, Jr., Rev. R. C. Waterston, and Edward I. Browne, of Boston, Resident Members.

January 18, 1860.

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

Mr. Scudder, Curator of Entomology, presented the following paper, entitled

A CHRONOLOGICAL INDEX TO THE ENTOMOLOGICAL WRITINGS
OF THADDEUS WILLIAM HARRIS, M. D.

It is supposed that Dr. Harris, shortly previous to his decease, was preparing a list of his own writings ; yet, though search has

been made, no such catalogue has been discovered ; and as it now seems to be entirely unlikely that it will be found, I have prepared the following Chronological Index to supply the deficiency, and would present it as being at all events approximately perfect.

A similar Table, in connection with the writings of other American entomologists, has lately been published in the "Linnæa Entomologica ;" but that it is quite incomplete may be inferred from the fact that only thirty-two articles were there referred to, while I have detailed no less than ninety-nine. I have seen every article here mentioned with but one exception.

No attempt has here been made to include the writings of Dr. Harris in other departments, though it could have been done without swelling the list very much, for they were not numerous. He wrote one or two articles upon mammals and birds, and a number of short ones upon the varieties of the squash, which are to be found in various agricultural journals.

In preparing this list, diligent search has been made through all our agricultural periodicals ; and how numerous those are, in which articles have been found, is easily seen by glancing at the list appended to the Index. Much assistance in perfecting the list has been derived from references by Dr. Harris, discovered in the agricultural works in his library.

1. Upon the natural history of the salt-marsh caterpillar (*Arctia pseuderminea*), with a plate. Massachusetts Agricultural Repository and Journal, vii., No. 4, pp. 322-331, June, 1823.

(b) Reproduced without figures in the New England Farmer, i., No. 49, pp. 385, 386, July 5, 1823.

2. Description of four native species of the genus *Cantharis*. Boston Journal of Philosophy and the Arts, i., pp. 494-502, 1824.

(b) New England Journal of Medicine, Surgery, and collateral branches of Science, xiii., No. 3, pp. 243-250, July, 1824.

3. Caterpillars (*Oligiocampa Americana*). N. E. F. iv., No. 45, p. 354, June 2, 1826.

4. Peach-tree insect (*Ægeria persica*). N. E. F. v., No. 5, p. 33, Aug. 25, 1826.

5. Insects which destroy cocoons of silk-worms (*Dermestes lardarius*). N. E. F. v., No. 5, p. 33, Aug. 25, 1826.

6. Trees. Abstract of a report on the state of the elm-tree in St. James and Hyde Parks, by W. S. MacLeay, (with additional remarks). N. E. F. v., No. 22, pp. 169-171, Dec. 22, 1826.

7. Dr. Hunt's insect (*Tremex columba*). N. E. F. v., No. 27, p. 211, Jan. 26, 1827.

8. Descriptions of three species of the genus *Chremastocheilus*. Journal of the Academy of Natural Sciences of Philadelphia, v., pp. 381-389, Feb. 1827.

9. Minutes towards a history of some American species of *Melolonthæ*, particularly injurious to vegetation. Mass. Ag. Rep. x., No. 1, pp. 1-12, July, 1827.

(b) Reproduced in N. E. F. vi., No. 2, pp. 9, 10, Aug. 3, 1827; No. 3, pp. 18, 19, Aug. 10, 1827.

10. Insects on peach-trees (*Aphides*). N. E. F. vi., No. 50, p. 393, July 4, 1828.

11. Insects (*Gastropacha velleda*, *Ægeria cucurbitæ*, *Arctia textor*). N. E. F. vii., No. 5, pp. 33, 34, Aug. 22, 1828.

12. The curculio, or worm in fruit (*Conotrachelus nenuphar*). N. E. F. vii., No. 11, pp. 81, 82, Oct. 3, 1828.

13. Contributions to Entomology. N. E. F. vii., No. 12, pp. 90, 91, Oct. 10, 1828.

14. Contributions to Entomology, No. II. N. E. F. vii., No. 15, pp. 117, 118, Oct. 31, 1828.

15. Contributions to Entomology, No. III. N. E. F. vii., No. 16, pp. 122, 123, Nov. 7, 1828.

16. Contributions to Entomology, No. IV. N. E. F. vii., No. 17, p. 132, Nov. 14, 1828.

17. Contributions to Entomology, No. V. N. E. F. vii., No. 20, p. 156, Dec. 5, 1828.

18. Contributions to Entomology, No. VI. N. E. F. vii., No. 21, p. 164, Dec. 12, 1828.

19. Insects on fruit-trees (*Cocci*). N. E. F. vii., No. 24, pp. 186, 187, Jan. 2, 1829.

20. Additional remarks on the bark-louse or *coccus* (wood-cuts). N. E. F. vii., No. 37, p. 289, April 3, 1829.

21. American turnip butterfly (*Pontia oleracea*). N. E. F. vii., No. 51, p. 402, July 10, 1829.

22. Corrections and additions for the "Contributions to Entomology." N. E. F. viii., No. 1, pp. 1, 2, July 24, 1829.

23. Contributions to Entomology, No. VII. N. E. F. viii., No 1, pp. 2, 3, July 24, 1829.

24. Insects (*Egeria pyri*, *Ichneumon hordet*). N. E. F. ix., No. 1, pp. 1, 2, July 23, 1830.

25. Extracts from a paper entitled "Some account of the insect known by the name of the Hessian Fly, and of a parasitic insect that feeds on it, by Thomas Say," (with additional remarks). N. E. F. ix., No. 2, p. 9, July 30, 1830.

26. Locust (*Tettigonia vitis*, &c.). Encyclopædia Americana, viii., pp. 40-43, 1831.

27. A Discourse delivered before the Massachusetts Horticultural Society, on the celebration of its fourth anniversary, Oct. 3, 1832, pp. 54; in a pamphlet entitled, Fourth Anniversary of the Mass. Hort. Soc. Cambridge, 1832. 8vo.

(b) Reproduced in N. E. F. xi., 1833. No. 26, p. 204, Jan. 9; No. 27, pp. 212, 213, Jan. 16; No. 28, pp. 200, 201, Jan. 23; No. 29, pp. 225, 226, Jan. 30; No. 30, pp. 236, 237, Feb. 6; No. 31, pp. 244, 245, Feb. 13; No. 32, pp. 252, 253, Feb. 20.

28. Report on the Geology, Mineralogy, Botany, and Zoölogy of Massachusetts, by Prof. Hitchcock. Amherst, 1833. Part viii., Insects. pp. 566-595.

(b) Second edition of the same, corrected and enlarged. Amherst, 1835. 8vo. Part viii., Insects. pp. 553-602.

(c) The latter part of (b), published separately at the same time, under the title, — Catalogue of the Animals and Plants of Massachusetts, with a copious index. Amherst, 1835. Part viii., Insects. pp. 33-82.

29. On a parasite of the honey-bee. Horticultural Register and Gardener's Magazine, pp. 44, 45, Feb. 1835.

(b) Reproduced in N. E. F. xiii., No. 30, p. 233, Feb. 4, 1835.

30. Upon the economy of some American species of *Hispa*, (wood-cuts.) Boston Journal of Natural History, i., No. 2, pp. 141-151, 1835, read Feb. 18.

31. Characteristics of some previously described North American Coleopterous insects, and descriptions of others which appear to be new, in the collection of Mr. Abraham Halsey. Transactions of the Natural History Society of Hartford, (with a colored plate,) communicated Dec. 23, 1835, No. 1, pp. 65-91, 1836. 8vo. Hartford, Conn.

32. Report of the Commissioners on the Zoölogical Survey of the State, (containing) Dr. Harris's Report (on Coleoptera). pp. 57-104. April, 1838. 8vo. Mass. House Document, No. 72.

33. Remarks upon *Scarabæus goliatus*, and other African beetles allied to it. Journal of the Essex County Natural History Society, i., No. 2, pp. 101-107. 1839. 8vo. Salem, Mass.

34. Remarks upon the North American insects belonging to the genus *Cyrchus* of Fabricius, with descriptions of some newly detected species. Bost. J. of Nat. Hist. ii., No. 2, pp. 189-204, Feb. 1839, read Aug. 15, 1838.

35. Worms in seed corn (*Butalis cerealella*). Yankee Farmer, v., No. 6, p. 43, Feb. 9, 1839.

36. Descriptive catalogue of the North American Insects belonging to the Linnæan genus *Sphinx*, in the cabinet of the author. American Journal of Science and Arts, xxxvi., No. 2, pp. 282-320, July, 1839. 8vo.

37. A Report on the Insects of Massachusetts, injurious to vegetation, published agreeably to an order of the Legislature, by the Commissioners on the Zoölogical Survey of the State. Cambridge: Folsom, Wells & Thurston, 1841. 8vo.

(b) Another impression of the same, printed at the charge of the author, entitled — A Treatise on some of the Insects of New England, which are injurious to vegetation. Cambridge: published by John Owen, 1842.

(c) Same title as (b); second edition. Boston: printed by White & Potter, 1852.

38. Wheat insects (*Calandra granaria*, *Tinea granella*, *Æcophora cerealella*). N. E. F. xix., No. 38, p. 300, March 24, 1841.

39. Wheat insects, continued (*Cecidomyia tritici*). N. E. F. xix., No. 39, pp. 306, 307, March 31, 1841.

40. Memorandum on the larva of *Papilio Philenor*. Newman's Entomologist, Part ii., No. 4, pp. 60, 61, April, 1841.

41. Remarks on some North American Lepidoptera, by Edward Doubleday, Esq., including a communication from T. W. Harris, M. D., of Boston, U. S. (*Dryocampa? Saccophora Melsheimeri*) (wood-cuts). Newm. Ent., No. 7, pp. 99-101, May, 1841.

42. Plum-tree grubs (wood-cuts). N. E. F. xix., No. 51, p. 405, June 23, 1841.

43. Apple-tree borer, *Saperda bivittata* (wood-cut). Massachusetts Ploughman, i., No. 17, Jan. 22, 1842.

(b) Reproduced in N. E. F. xx., No. 33, pp. 260, 261, Feb. 16, 1842.

44. The squash-vine destroyer (*Ageria cucurbitæ*) (wood-cut). N. E. F. xx., No. 33, p. 260, Feb. 16, 1842.

45. Squash-vine destroyer (*Ageria cucurbitæ*). Mass. Plough. i., No. 37, June 11, 1842.

46. A new disease of the plum. Hovey's Magazine of Horticulture, viii., pp. 247, 248, July, 1842.

47. Blight-beetle (*Tomicus pyri*). Mass. Plough. ii., No. 38, June 17, 1843.

(b) Reproduced in N. E. F. xxii., No. 3, p. 21, July 19, 1843.

48. The disease of the sycamore-tree. N. E. F. xxi., No. 50, p. 406, June 21, 1843.

49. Apple-worm, curculio, plum grub (*Carpocapsa pomonella*, *Conotrachelus nenuphar*). N. E. F. xxii., No. 2, p. 13, July 12, 1843.

50. Description of an African beetle allied to *Scarabæus polyphemus*, with remarks upon some other insects of the same group. Proceedings of the Boston Society of Natural History, i., pp. 151-153, read Nov. 1, 1843, (signatures Nov. and Dec. 1843).

51. Description of an African beetle, &c., as above (with steel plate). Bost. J. of Nat. Hist. iv., No. 4, pp. 397-405, Jan. 1844.

52. Coated Saperda of the linden-tree (*Saperda vestita*). Farmer's Cabinet, viii., No. 7, pp. 213, 214, Feb. 15, 1844.

53. Some account of the insect that attacks the grape-vine (wood-cuts) (*Procris Americana*). Hovey's Mag. x., pp. 201-205, June, 1844.

54. A new depredator of the orchard (*Clisiocampa sylvatica*). N. E. F. xxii., No. 52, p. 412, June 26, 1844.

55. Destructive insects on peach-trees and grape-vines at Nantucket (*Cocci*). N. E. F. xxiii., No. 1, pp. 4, 5, July 3, 1844.

56. Cucumber skippers (*Smynturus cucumeris*) (wood-cuts). Mass. Plough. iii., No. 42, July 20, 1844.

57. Remarks upon *Saperda vestita*, the borer of the linden-tree, with extracts from letters upon the same insect (wood-cuts). Hovey's Mag. x., pp. 330-333, Sept. 1844.

58. Insects in the corn (*Butalis cerealella*). Far. Cab. xi., No. 4, pp. 106, 107, Nov. 16, 1846.
59. Microgasters. Boston Cultivator, ix., No. 18, p. 138, May 1, 1847.
60. On the blights of the pear-tree (*Tomicus pyri*). Downing's Horticulturalist, ii., No. 8, pp. 365-367, Feb. 1848.
61. Canker-worms (*Anisopteryx vernata*). Prairie Farmer, viii., No. 6, pp. 172, 173, June, 1848.
- (b) Reproduced in Mass. Plough. vii., No. 39, June 24, 1848.
62. The potter-wasp (*Eumenes fraterna*) (wood-cut). Bost. Cult. x., No. 29, p. 225, July 15, 1848.
63. Correspondence on the black-wart of the plum-tree (*Cicada*). Down. Hort. iii., pp. 277-279, Dec. 1848.
64. Canker-worms (*Anisopteryx vernata*). Bost. Cult. xi., No. 47, p. 376, Nov. 24, 1849.
65. *Termites*. New Orleans Picayune, (late in 1849 or early in 1850).
66. Description of some species of Lepidoptera from the northern shores of Lake Superior, (lithographic plate,) Lake Superior, by Louis Agassiz. Boston, 1850. 8vo. Art. ix., pp. 386-394.
67. Saw-fly of the raspberry, *Selandria (hoplocampa) rubi* (wood-cuts) (a part of a letter to Miss Darling). N. E. F. (new series) ii., No. 2, p. 33, Jan. 19, 1850.
68. Insects on potatoes (*Baridius trinotatus*). N. E. F. ii., No. 13, p. 204, June 22, 1850.
69. Potato-bug (*Cantharis vittata*). Prair. Far. x., No. 8, p. 247, Aug. 1850.
70. Injurious insects (*Conotr. nenuphar*, *Carpocapsa pomonella*, *Aphides*, *Clisio. Americana*, *Anisop. vernata*, *Macr. subspinosus*). N. E. F. ii., No. 16, p. 252, Aug. 3, 1850.
71. Canker-worms (*Anisopteryx vernata*). Mass. Plough. x., No. 8, Nov. 23, 1850.
72. Canker-worms (*Anisopteryx vernata*). Mass. Plough. x., No. 33, May 17, 1851.
73. The currant-tree borer (*Ageria tipuliformis*) (wood-cut). Hovey's Mag. xvii., pp. 241-244, June, 1851.
74. Plum weevils (*Conotrachelus nenuphar*). Bost. Cult. xiii., No. 24, p. 187, June 14, 1851.
- (b) On the curculio. Down. Hort. vi., p. 341, July, 1851.

75. Letter on potato-rot. Salem Observer, xxix., No. 28, July 12, 1851.

(b) Reproduced in Bost. Cult. xiii., No. 29, p. 228, July 19, 1851.

(c) Insects not the cause of the potato-rot. N. E. F. iii., No. 16, pp. 259, 260, Aug. 2, 1851.

76. A new insect depredator (*Capsus quadrivittatus*). N. E. F. iii., No. 17, p. 268, Aug. 16, 1851.

77. Insects on the potato-vine (*Aphides*, *Phytoecoris lineolaris*, *Haltica cucumeris*, *Crio. trilineata*, *Canth. vittata*, &c.) The Journal of Agriculture, i., No. 4, pp. 99-102, Sept. 3, 1851.

78. Chinch-bug (*Rhyparochromus devastator*). Albany Cultivator, viii., No. 12, pp. 402, 403, Dec. 1851.

79. On *Cicindela* (wood-cuts). Family Visitor, ii., No. 39, p. 305, Feb. 3, 1852.

80. Canker-worms (*A. vernata*). N. E. F. iv., No. 4, pp. 155, 156, April, 1852.

81. Letter to Dr. Princkle, giving a history of his Report. Fam. Vis. ii., No. 50, p. 398, April 20, 1852.

82. The joint-worm (*Eurytoma hordei*). N. E. F. iv., No. 8, pp. 385, 386, Aug. 1852.

83. The oak-pruner (*Stenocorus putator*). N. E. F. iv., No. 9, p. 425, Sept. 1852.

84. The oak-pruner. N. E. F. iv., No. 10, p. 453, Oct. 1852.

85. Insects in the wheat (*Eurytoma hordei*). J. Ag. iii., No. 10, pp. 290, 291, April, 1853.

86. The palmer-worm (*Rhinosia pometella*). Cambridge Chronicle, viii., No. 30, July 23, 1853.

(b) Reproduced in Transactions of the New York State Agricultural Society, xiii., pp. 190-192, 1854. (See No. 90.)

87. The palmer-worm. N. E. F. v., No. 8, pp. 370, 371, Aug. 1853.

88. The rosy *Hispa* and the drop-worm (*Hispa rosea*, *Oiketiscus coniferarum*) (wood-cuts). Down. Hort. viii., pp. 461-464, Oct. 1853.

89. Report on some of the diseases and insects affecting fruit-trees and vines. Proceedings of the third session of the American Pomological Society, and their fifth meeting, held in Boston Boston, 1854. 8vo. pp. 210-218.

(b) Reprinted under the title — Report on insects and diseases injurious to vegetation. Boston, 1854. pp. 11.

(c) Reproduced in Journal of the United States Agricultural Society for 1854, pp. 197–210, 1855.

90. Letter from Dr. Harris (*Ithycerus noveboracensis*). Trans. N. Y. St. Ag. Soc. xiii., pp. 188, 189, 1854.

(b) Reprinted with 86 (b) and other matter as — Apple-tree pests, pp. 11–13. 86 (b) formed pp. 13–16.

91. Description of *Rhinosia pometella*, Harris. Proc. Bost. Soc. iv., pp. 349–351, read July 20, 1853 (signature Feb. 1854).

92. Extract of a letter to Dr. Kirtland, from Dr. Thaddeus W. Harris, dated Cambridge, March 13, 1854 (*Vanessa milberti*). Annals of Science, Cleveland, Ohio, ii., No. 4, p. 100, April, 1854. 8vo.

93. Note upon the insects injurious to the roots of the cultivated grape-vines in North Carolina, in a pamphlet entitled, The grape-vine borer, — in a communication on the grape-vine, by Dr. E. Mitchell, in the Raleigh Register for April 5, 1854. 8vo. pp. 6, 7.

94. Larvæ of the crane-fly (*Tipula* —). N. E. F. vi., No. 5, p. 210, May, 1854.

95. Canker-worms (*A. vernata*). N. E. F. vi., No. 8, p. 363, Aug. 1854.

96. The *Cetonia Inda*. N. E. F. vi., No. 10, pp. 457–458, Oct. 1854.

97. The Indian *Cetonia*. N. E. F. vi., No. 10, p. 485, Oct. 1854.

98. The measure-worm (*Geometra niveosericearia*) (wood-cut). Hovey's Mag. xxi., pp. 418–423, Sept. 1855.

99. Rose-bug (*Macrodactylus subspinosus*). Bost. Cult. xvii., No. 36, p. 283, Sept. 8, 1855.

PERIODICALS REFERRED TO.

1. Massachusetts Agricultural Repository and Journal. Boston. 8vo.

2. New England Farmer. Boston. 1st series 4to. 2d series 8vo.

3. Boston Journal of Philosophy and the Arts. Boston. 8vo.

4. New England Journal of Medicine, Surgery, and collateral branches of Science. Boston. 8vo.
5. Boston Journal of Natural History. Boston. 8vo.
6. Proceedings of the Boston Society of Natural History. Boston. 8vo.
7. Massachusetts Ploughman. Boston. Folio.
8. Hovey's Magazine of Horticulture. Boston. 8vo.
9. Boston Cultivator. Boston. Folio.
10. Downing's Horticulturalist. New York. 8vo.
11. Horticultural Register and Gardener's Magazine. Boston. 8vo.
12. Yankee Farmer. Boston. 8vo.
13. Journal of the Academy of Natural Sciences of Philadelphia. Philadelphia. 8vo.
14. Encyclopædia Americana. Philadelphia. 8vo.
15. Newman's Entomologist. London. 8vo.
16. Farmer's Cabinet. Philadelphia. 8vo.
17. Prairie Farmer. Chicago, Ill. 8vo.
18. Salem Observer. Salem, Mass. Folio.
19. The Journal of Agriculture. Boston. 8vo.
20. Albany Cultivator. Albany, N. Y. 8vo.
21. Family Visitor. Cleveland, Ohio. Folio.
22. Journal of the United States Agricultural Society. Boston. 8vo.
23. Transactions of the New York State Agricultural Society. Albany. 8vo.

Dr. J. C. White made a communication on two very interesting and valuable specimens, one the lower jaw of an enormous sperm whale, (*Physeter macrocephalus*, Shaw,) the gift of F. W. Choate, Esq., of Beverly, the other a tooth of the same species, which, though diseased, served beautifully to illustrate the dental development of this animal, and the peculiar change in the same produced by age or accident. The latter was given by G. H. Folger, Esq., obtained through the kindness of Dr. J. B. S. Jackson.

The first belonged undoubtedly to an animal fully 80 feet

long, for a portion has been broken from the anterior extremity, probably 3 feet at least. The following are the gross dimensions :

Total length of specimen	16 ft. 4 in.
Length of rami from point of divergence	6 ft. 4 in.
Breadth of same at widest portion of wing	2 ft. 2 in.
Extent of expansion from one condyle to the other	6 ft.
Area of articulating surface of condyle	7 by 9 in.
Circumference of horizontal bodies in apposition	2 ft. 6 in.
Length of tooth-furrow	11 ft.

The larger tooth sockets, of which but 19 remain, measure 7 inches in length, $3\frac{1}{2}$ in width, and $2\frac{1}{2}$ in depth.

As seen by the above measurements, the tooth-furrows are continued up a foot upon the edge of the rami after their divergence. On comparison with a young specimen exhibited, which is 66 inches only in total length, and contains 25 teeth, we see the alveolar process lying for the distance of 26 inches upon the horizontal portion, and running 10 inches along the edge of the rami. We conclude, therefore, that at this age a much larger proportion of the teeth occupy this situation, and that with increasing maturity and strength they pass forward, and are almost wholly confined to the more advantageous situation of the body.

The teeth are conical, ovoid or flattened laterally, and more or less pointed and worn according to age and usage. They curve forward and toward the median line, and, as is the case, with a single exception, among all the cetacea, are implanted in the alveolar process by a single root. While young they are conical, sharply pointed, and much curved, presenting a reptilian appearance. At this period they are hidden by the gum or project but slightly from it, and in fact are retained in their place through life more by the soft tissues than by any bony surrounding, so that a cabinet specimen containing teeth is seldom met with, as the ligamentous gum, when allowed to become dry, brings away with itself, when removed, the whole series. The development of the tooth matrix, analogous to the same process in fishes, goes on within the gum, and is never inclosed by a bony cavity. Gradually with age the alveolar process deepens; the fang, still a hol-

low cone filled by the pulp, sinks more deeply into the jaw, and shallow transverse walls of division spring up between the teeth and form the separate sockets. These, however, never close up and grasp the shaft of the tooth as in the mammalia generally, for such a firm setting would be unnecessary for teeth which meet no opponents to clash against, but fall within soft pockets. The bottom of the pits, as well as their septa, are traversed by numerous large canals, through which the long-continued activity of the dental pulp or matrix is nourished and sustained. After many years this loses its vitality, and, not possessing the life-long and unwearied generative power of the rodent's incisor, tapers to a narrow cleft by the contraction of the fang, and solidifies. A small opening, however, is always left, by which the mature tooth may still keep up a low vital connection with the vascular system. This process of development once complete is never repeated.

The structure of the tooth of *Physeter* consists of a hollow cone of dentine surrounded by a coating of cement, which, when first formed, according to Owen, is tipped by a thin cap of enamel. The cement, as in all the cetacea, is very thickly deposited, and especially so on the anterior or convex surface. This is to counteract the attrition by which this face is constantly worn down, as may be seen on the summits of all the specimens in the cabinet. This action, which the dentine resists longer, though according to analysis of a more organic nature, gradually reduces the tooth to a stump after the reparative power of the matrix is exhausted. The tubes of the dentine are arranged at an acute angle with the central axis of convergence, and follow the sub-curves of direction which the tooth assumes. This is the normal development. Not unfrequently, however, a new element enters into their composition, of which traces are often visible in their early stages of growth. This is the production of a deposit within and arising from the dentinal pulp, called *osteo-dentine*, a substance more resembling cement or true bone than the dentine itself; it is a modification of this latter element, in which its cellular matter is arranged in concentric layers, and furnished with radiated cells like the corpuscles of bone. As above stated, and as was well illustrated by a section of an immature tooth, isolated nodules of this material are often found imbedded in the early-formed dentine tissue. Generally, however, it is in more mature teeth, and

when the vital powers of the matrix begin to flag, that this is more abundantly formed, and often the remnant of the pulp is converted into it, and thus fills up the cavity of the contracting fang.

A most remarkable development of this substance is exhibited in the specimen alluded to in the beginning as presented by Mr. Folger. Here we see a longitudinal section of an enormous tumor connected with the base of the tooth. This mass is composed of large nodules or lobular conglomerations of *osteo-dentine*, divided in the centre by numerous fissures once filled with pulp, which in time would have been closed up by fresh deposit. The exterior is of an irregular lobulated shape, covered with innumerable warty excrescences and sharp spicula. Laterally and posteriorly the tumor is covered by a bulging plate of the true dentine and cement, by extension from the normal matrices of the posterior portion of the pulp. A few nodules of the same growth are found on the exterior surface of the tooth, and situated high up within the dentinal tissue of the interior; not more, however, than is often met with.

The normal or upper part of the tooth is of the following dimensions. Breadth of surface of an antero-posterior longitudinal section at base, 3 in. Circumference at same part, 8 in. Length of central axis, 5 in. Greatest thickness of cement, 8 lines. Originally the tooth was a very large one, but is now much worn at the tip. On the posterior surface the cement extends downward 6 in. 8 lines, whereas on the anterior or diseased side it is only 4 in. 8 lines in length. Its growth in front was at first checked by an undue development of the dentine matrix, and then entirely obliterated by conversion of the same into this enormous mass of *osteo-dentine*, which extends 6 in. in a perpendicular direction below the termination of the cement, and for the same distance antero-posteriorly. It measures around the circumference 17 in., and is almost wholly confined to the anterior side of a line drawn parallel to the axis of the tooth.

This great outgrowth must of course have produced an absorption of the alveolar process in the direction of its increase, and caused trouble to its neighbor in front. The axis of the tooth must have been changed from the normal, for the lateral portion of its summit has been worn away flat, produced undoubtedly by

continued contact with the alveolar ridge of the upper jaw. Unfortunately we have no history connected with the specimen, nor any description of the appearance of the socket which held it.

In reply to various questions, Capt. N. E. Atwood stated that the rorquals or fin-back whales are considered the swiftest of cetaceans, and are rarely attacked by whalers, as they can do nothing with them, and even when killed by a bomb-lance they afford comparatively little oil. The food of the sperm whale, judging from what they eject from the stomach when struck by the harpoon, consists principally of large squids or cuttlefish. It is estimated that about one fifth of the yield of oil may be generally set down as the amount of spermaceti afforded by a sperm whale.

Dr. B. J. Jeffries announced that he had made an experiment of injecting 2 drachms of pure honey into the dorsal sac of a medium-sized frog; the animal was kept from water, and died in twenty-nine hours with convulsions; twenty-one hours after death there was no appearance of cataract on dissection.

Dr. Henry Bryant read the following paper on two birds from Bogota:—

In the *Revue Zoologique* for 1848, Lafresnaye describes a species of thrush under the name of *Turdus minimus*. Sclater, in his list of Bogota birds, published in the Proceedings of the Zoological Society for 1854 and 1855, mentions this species with a doubt as to its specific value; and in his synopsis of American *Turdida*, published in the same journal for 1859, quotes it as synonym of *Turdus Swainsonii*, (Cab.) The specimens of this thrush in my cabinet which agree with Lafresnaye's description are certainly specifically distinct from the North American *T. Swainsonii*, and are more easily recognized than some of the other closely allied species of this difficult group. It is much smaller in every respect,—being one inch shorter, 6 inches in length instead of 7; the wing 3.75 instead of 4.15; tail 2.60 instead of 3.10; tarsus 1 instead of 1.12. The bill is broader and stouter,

not only relatively but actually. In its color it differs by the much deeper tint of yellowish rufous on the breast, and by the spots being thicker and much darker, particularly toward the abdomen, so as to give the whole under surface a much darker appearance. The light spots at the base of the inner webs of all but the outer three quills are whiter and more distinct, forming a marked band on the inner surface of the wing, which in *T. Swainsonii* is quite indistinct. I think, therefore, that Lafresnaye's name of *minimus* should be restored to it.

In Sclater's list of Bogota birds, published in the Proceedings of the London Zoölogical Society, two species of *Vireo* are mentioned, — *Vireo olivaceus* and *V. Bartramii*. I am not positive that the specimen in my cabinet is identical with those examined by Sclater, but it is certainly neither the *V. olivaceus* nor the *V. Bartramii*. It has been in my possession since 1845, and I have been constantly expecting to see it described, but as it seems to have been neglected, I shall describe it here.

Vireo Bogotensis. Length of skin, 5 to $5\frac{1}{2}$ inches; wing, $3\frac{1}{8}$; tail, $2\frac{1}{8}$; tarsus, $\frac{5}{8}$; middle toe, $\frac{7}{8}$; 2d primary longest, 1st shorter than 3d, and intermediate between it and the 4th. Above, greenish olive, the green tint most conspicuous on the tail-coverts; head plumbeous, with a dirty white line from the nostril over the eye, bordered by a blackish line between it and the cinereous of the crown — most strongly marked above and behind the eye; wings brown, with the edge of the outer webs of all but the first quill of the same olive tint as the back, and the inner webs of all but the first primaries toward the tips bordered with whitish; central feathers of the tail olive, and the outer edge of all but the outer two of the same color; below, soiled white, slightly washed with cinereous and yellowish on the breast; abdomen nearly pure white; crissum clear pale yellow; flanks and hypochondriacs cinereous olive; tarsi with six large scales anteriorly, much more distinctly marked than in *V. olivaceus*. The bill is stouter, and the gonyes, instead of being compressed so as to form a distinct ridge toward the tip, is rounded and slightly flattened.

Prof. W. B. Rogers exhibited specimens of fossiliferous slate and sandstone from the Dennis River in Maine, and gave a sketch of the order of stratification in that

vicinity and toward the northeast. He referred especially to the conditions of metamorphism of the shales and slates in the neighborhood of Eastport, which, while displaying all the evidences of profound alteration in their increased density and in the development of crystalline and other chemical compounds throughout their substance, give little indication of having been subjected to violent agencies of a mechanical kind. He also spoke of the enormous extent to which coarse conglomerate rocks are intercalated among the slates and sandstones of the sections lately examined by him in this northeastern part of Maine, and called attention to the fact that in many cases the finer of these sedimentary deposits have been so indurated and otherwise modified as to have put on a close resemblance to trappean masses. The latter, however, in their genuine form are, he thought, of far less frequent occurrence in this region than at first view would be inferred. He spoke of the great thickness of the Devonian and Silurian strata as developed here and in the adjoining British territories, and of the interesting field of structural geology and paleontology which they offered.

Capt. Atwood presented a specimen of a spine of the fin of some siluroid fish, which had been found deposited in the blubber of a whale killed on the west coast of Africa, in such numbers that it was with difficulty cut up; they had probably worked their way through from the stomach.

The Corresponding Secretary read the following letters, viz: —

From H. Drouet, Paris, November 9, 1859, proposing exchange of specimens; Elliott Society, Charleston, S. C., December 16, 1859, and Regents of New York University, December 31, 1859, acknowledging the receipt of the Society's publications;

from Prof. J. L. Riddell, New Orleans, January 5, 1860, and Rev. R. C. Waterston, January 10, accepting membership; from the Royal Geographical Society, London, September 9, 1859, presenting Vol. 28 of their Journal.

February 1, 1860.

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

Dr. C. F. Winslow exhibited a specimen of the so-called "cocoa-nut pearl" set in a ring, belonging to Frederic T. Bush, Esq., of Boston; Mr. Bush offered this to the Society for examination and chemical analysis. It came from Singapore; very few specimens are found; they are highly esteemed by the rajahs, and are worn like costly gems. Mr. Bush, during his residence of some years in China, saw but one other, and that was as large as the egg of a canary bird; he has heard of others as large as a cherry. The method of their growth is unknown to him from personal observation; but they are said to be found free within the cavity of the cocoa-nut. The specimen was referred to Dr. Bacon for chemical and microscopic examination, and the thanks of the Society were voted for the permission to examine it.

Mr. Bouvé said that he had seen another and a larger specimen from the same locality, some years ago, in the hands of a gentlemen who had been consul at Singapore, who also stated that they are considered rare and very precious by the natives.

Dr. B. J. Jeffries exhibited an optical apparatus suggested by Dr. Ludwig of Vienna, which introduced the general subject of vision.

Prof. Rogers thought that the physiology of vision was as yet but imperfectly understood ; vision by corresponding points of the two retinæ, for instance, cannot be maintained, though it is found in all treatises on physiology, and in most on optics.

Dr. Gould referred to the fact that though in strabismus there is distinct vision with the normal eye, the other being unused, squint-eyed persons cannot get the stereoscopic solid image, but only see a flat picture.

Prof. Rogers remarked that there is such a thing as being right-eyed and left-eyed, as well as right-handed and left-handed ; indeed many persons use but one eye for taking their direction in vision, and that is generally the right ; it is sometimes the left, but in normal instances an object is seen in the median plane between the two eyes. Many persons have the idea that stereoscopic vision is only squinting, but this is very far from being the case ; in squinting, the eyes converge to a point nearer than that of distinct vision ; in stereoscopic vision the eyes are not so directed, and the sense of fatigue and discomfort is owing to the forcible dissociation of two naturally associated actions. In common vision there are two adjustments, one consisting in directing the optic axes to the object, the other in adjusting them to suit the distance of the object from the eyes, drawing them, so to speak, out or in like the joints of a telescope ; habit enables us to effect these two adjustments instantaneously and at the same time. In looking through a stereoscope, while the object is very near, we are forced to extend our optic tubes to see an object apparently at a great distance, and thus the union of the associated motions is violently broken up, causing a sense of fatigue.

The Corresponding Secretary read the following letters, viz : —

From Dr. John Evans of Washington; Theodore N. Gill of Brooklyn, N. Y.; and Alpheus S. Packard, Jr., of Brunswick, Me.; accepting corresponding membership of the Society;— from the Royal Bavarian Academy, Munich, sending their publications; and from the Committee of the Humboldt Foundation, Berlin, asking the coöperation of the Society in the establishment of a fund for the promotion of scientific talent in works on Natural History and distant travels.

Mr. Nathaniel T. Allen of West Newton, Dr. Gustavus Hay of Boston, and Alpheus Hyatt, Jr., of Cambridge, were elected Resident Members.

February 15, 1860.

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

Prof. Agassiz made a verbal communication in opposition to the theory of Mr. Darwin, recently put forth in his work on the origin of species. Mr. Darwin he acknowledged to be one of the best naturalists of England, a laborious and successful writer; his works on the coral reefs, on the cirripeds, and his narrative of the voyage of the Beagle, show him to be a skilful and well prepared naturalist; but this great knowledge and experience had, in the present instance, been brought to the support, in his opinion, of an ingenious but fanciful theory. According to Darwin, the primary cell, by a process of differentiation and gradual improvement by natural selection, has produced all the diversities of animals, in geological and present times. He did not think it fair to compare the present fauna of the world with the fauna of any geological horizon as known in one locality; and he thought this method of comparison had led to this idea of gradual development. Animal representatives were as numerous and diversified in early geological periods as now; he instanced the brachiopods. In the lowest beds of the Potsdam sandstone we find *Lingula prima*, and allied species are found in the Silurian, De-

vonian, Carboniferous, Permian, and Triassic, and with occasional interruptions up to the living species ; there is an unbroken succession of *lingulæ* up to the Jurassic strata ; they are not found in the oölite, in the seven beds above the lias ; in the lowest cretaceous (neocomian) they appear again, then there is an interruption until the Tertiary epoch. About forty species of fossil *lingulæ* are found in these beds ; only seven species of living *lingulæ* were known to exist until he had recently added an eighth (*L. Ravenelli*, Ag.) from South Carolina, the first found on the American side of the Atlantic basin ; when the shell gapes, one valve moves over the other, a circumstance rare in the brachiopods. He thought the persistence of this form through so extensive a period, the last no more perfect than the first, was a fatal objection to the theory of gradual development.

Prof. Rogers admitted that the persistency of *lingula*, and other similar cases that might be adduced, were formidable objections to this theory ; but he thought that Darwin would meet such objections by the fact that the vital characters of some animals fit them for resisting change and extinction better than more plastic natures ; from our knowledge of domesticated animals we find that dogs have changed very much, and that cats have changed hardly at all ; some have great energy of resistance, and some very little. He adduced several cases of interruption, like those in Bohemia illustrated by Barrande, and in middle Tennessee by Mr. Safford, which he explained by migrations to and from a given region. On the coast of Virginia and Maryland there is an extensive oyster-bed, but which has not been continuous through all time ; at one time the oysters disappear, and clams make their appearance ; the latter disappear, and oysters reappear ; these he regarded as instances of emigration and remigrations over great spaces. Similar facts in Bohemia, embracing strata of many thousands of years' duration, show evidences of re-introduction of forms from below, colonization, and remigration. In middle Tennessee, we have the Black River limestone over the Potsdam sandstone ; over this slaty limestones with Trenton fossils ; after several hundred feet of thickness, this is succeeded by the Black River fossils again. He thought these evidences of migration, and not in the least degree of sudden creation without

previous parents ; the *lingula* hiatus suggests a similar abandonment and return of allied species in remote geological epochs. In the case of *Calymene Blumenbachii*, which extends from the lower Silurian up to the Devonian, there is a great variety of forms acknowledged to be within the limits of one species, displaying a progressive variation amounting almost to specific difference. It may also be a question whether the geological horizon of animal origin has yet been reached in our investigations. He inquired of Prof. Agassiz if any vertebrate had ever been found in strata lower than the upper Silurian.

Prof. Agassiz remarked, as to these alleged migrations, that we know that species are well circumscribed within the limits of faunæ ; and that before such a line of argument can be followed, it must be shown that any species pass from one continent to another, except from man's agency. In regard to the geological horizon of animal origin, he observed that the azoic system of rocks is not so metamorphosed as not to show traces of fossils if they had existed ; fragments at least would be found ; yet these rocks immediately underlie the Silurian strata rich in fossils. He thought that in this lowest system of fossils there was such a co-ordination of the animal series as shows that all its great and principal classes were then existing. Pander has maintained the existence of fishes below the point alluded to by Prof. Rogers, from what are considered their remains ; he did not distrust these conclusions of Pander, though many do. Trilobites are found in the lowest beds ; these are complicated animals, and belong among the highest crustaceans ; in the three other great divisions of the animal kingdom it is not the lowest, but the highest representatives that are found ; the earliest fishes are among the most perfect of their class, and have many reptilian characters ; the mollusks belong to the high cephalopods, and the crinoids rank high among the echinoderms. In late general works, eleven or twelve subdivisions of the earth's crust are given ; D'Orbigny makes twenty-seven, but he was prepared to show the occurrence of at least forty-eight successive periods of change, with characteristic fossils found neither below nor above their respective beds ; the alleged identity of fossils in different strata was only apparent, and would be found so on actual comparison of specimens.

Mr. Emerson asked what had been the antecedents to the publication of the work on the "Origin of Species." He did not quite understand the attitude of the mind of the author; he thought that the mind of an investigator into the laws of nature ought to be judicial, prepared to weigh impartially the evidence afforded by all the facts, and to let the balance incline accordingly. But Darwin comes before the reader at once as an advocate of a seemingly foregone conclusion, and argues, not for the purpose of finding in what direction the evidence of any particular fact would lead the mind, but for the purpose of finding something in the fact favorable to his preconceived opinion. Admitting the difficulties in his theory, he tries to explain them away by various suppositions and *ifs*, which by frequent repetition and consideration seem in the mind of the author to become established truths, and are used as arguments.

Prof. Rogers stated in reply that the present work of Darwin is a *résumé* of his conviction on the subject, without the presentation of the facts upon which it rests, which he has not had time to arrange. The problem is admitted to be of transcendent difficulty, and such as no observer or theorist can hope now or perhaps ever positively to resolve. Mr. Darwin makes no pretensions to an absolute demonstration, but, after an impartial survey of the facts bearing on the subject and a candid appreciation of the opposing considerations, adopts the view set forth in his book, as offering, in his opinion, a more rational and satisfactory explanation of the history of living nature than the hypothesis of innumerable successive creations. Prof. Rogers regarded the work as marked in an extraordinary degree by fairness in the statement of opposing as well as favorable arguments, by the absence of dogmatism, and by all other evidences of a truth-loving spirit, as well as by the extent and variety of its knowledge and the breadth of its philosophical views.

As regards the statement that the most ancient types of life were higher or more perfect than recent ones, he had always considered Prof. Agassiz as maintaining that these earlier forms were of an embryonic character; and in this connection he remarked that the term "perfection" is just as indefinite as the word "species." He considered perfection as specialization in

each type; if an animal approach nearer perfection because, for instance, it be part fish and part reptile, or if a structure part animal and part vegetable be more perfect than the plant, then is the cell the type of perfection, combining as it does properties belonging to both kingdoms; he considered perfection, not the union of different types, but specialization in each particular type.

Prof. Agassiz considered perfection to mean an embodiment of the highest combinations, the most complex representation of life. The embryo fish presents features of its type superior to those of the adult fish; the tendency to specialization increases with its growth, and the animal at last becomes only a fish, losing its embryonic type of the higher vertebrates. As a generalization or philosophic conception, the vertebrate egg is superior to man himself, inasmuch as it embodies all that may be produced from it.

Mr. Scudder presented by title a description of *Hoplocampa rubi* by the late Dr. T. W. Harris, with remarks on its history by Noyes Darling, Esq., in letters to the same, as follows:—

Family TENTHREDINIDÆ.

Genus *Selandria*, (Leach.)

Sub-genus *Hoplocampa*, (Hartig.)

Selandria (H.) rubi (Harris).* Black; a spot on each side of the collar, middle of the dorsum, and legs, dirty yellow; hindmost tarsi dusky; wings smoky. Length of the body nearly one fifth, expansion of wings one half of an inch.

Larva, green: 6 dorsal rows of tubercles bearing 2 black bristles, and 4 lateral rows on each side bearing white bristles; most of these tubercles have 2 bristles, some have 3, and the anterior ones of the first segment have 4 or 5 each,—the tubercles alternate in the rows. Each segment, therefore, has 14 setigerous tubercles; along the lower margin of the body are a few more single bristles, or short tubercles, irregularly placed. Bristles not barbed, $\frac{7}{16}$ th of an inch in length.

* See Address upon Injurious Insects, by Noyes Darling, p. 13. New Haven, 1845. New England Farmer, i., p. 164, 1849; ii., p. 88, 1850.

The imago is found resting on the upper side of the leaves of the raspberry, which this insect attacks. When the leaf is touched the insect falls as if dead, but in two or three seconds takes wing. It is very easily caught.

The eggs seem to be placed between the coats of the leaf, by the side of the ribs, and, as they increase in size, produce an oval expansion of the under coat, and a discoloration of the cuticle of the upper side, directly over the egg.

The larva appears early in May, on leaves that have a warm exposure and are near the ground. It leaves the bush about the time the fruit ripens, goes into the ground, forms around itself an oval coat of earth cemented together, and remains till spring. Larva taken at Cambridge, full grown, June 19, 1846.

Dr. C. F. Winslow presented some freshwater fishes, crustaceans, and mollusks from the Sandwich Islands; the first two were taken in the river Wailukee, in the mountains of West Maui, seven or eight miles from its mouth, and more than 1,000 feet above the sea; they are found in the midst of the most violent rapids; the fish are said by the natives not to be found near the sea. The shells were taken from a ditch connecting the river with the taro patches of the valley, three or four miles from the sea; collected in June.

Dr. Bernstein, of Java, E. Indies, and Edward Norton, Esq., of Albany, were chosen Corresponding Members; George N. Briggs of Auburndale, and Edward W. Codman of Boston, Resident Members.

March 7, 1860.

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

Mr. C. H. Hitchcock exhibited a geological map of Vermont, and explained the principal features of the complicated geology of that State.

The two most interesting points in this connection were, that there is no foundation for what Mr. Emmons called his Taconic system, (a mixture of the Silurian and Devonian,) and that the Dorset limestone (his Stockbridge limestone) is newer than the lower Silurian, and is probably upper Silurian or Devonian.

Prof. W. B. Rogers remarked upon the importance of the investigations referred to by Mr. Hitchcock, and spoke of the difficulty which the geologist has to encounter in attempting to ascertain the precise sequence of the rocks in a region where, as in the greater part of Vermont, perplexing structural features, metamorphic influences, and an extreme paucity of fossils combine to embarrass his inquiries. It is not therefore matter of surprise that, in spite of repeated explorations, some important problems in the geology of the State should still remain unresolved.

As regards the belt of formations on the western side of the State, extending along the shore of Lake Champlain, the abundance of fossils and the almost undisturbed position of the strata have rendered their investigation comparatively easy, so that these formations were early identified with the lower members of the paleozoic series, from the Potsdam sandstone to the Hudson River group inclusive. Immediately eastward of this narrow strip is another belt of variable breadth, extending through more than half the length of the State, and passing northward into Canada. This consists of reddish sandstones and shales, and reddish, white, and gray limestones, which, from lithological peculiarities and the absence of distinct fossils, were much less easily referred to their proper geological position. Indeed it is only within a few years that this remarkable group of strata has been generally recognized as belonging to the period of the Oneida and Medina rocks, to which Mr. Hitchcock now refers them.

As connected with the history of this investigation, Prof. Rogers felt some satisfaction in stating that in a paper entitled "Notes on the Geological Structure of Western Vermont, &c.," communicated by him to the American Association at Albany in 1851, the manuscript of which he now submitted, he gave a detailed account of numerous sections and longitudinal tracings made during preceding seasons, and in express terms announced

the conclusion that the rocks in question were referable to the Levant, or in other words the Medina period. As, however, the chief interest of the discussions arising on the occasion had reference to the supposed Taconic system of Prof. Emmons, to which Prof. Rogers's observations had been largely directed, his statement of the age of the red rocks and associated limestones excited comparatively little attention at the time, although he believes it was the first distinct announcement of the conclusion regarding the geology of this belt which is now generally received. He however thinks that Prof. Hall mentioned at the time having arrived at a similar result. As this paper was not published in the Transactions of the Association, but only mentioned by its title, Prof. Rogers asked to be allowed to insert in the Proceedings of the Natural History Society an extract setting forth the conclusion and the arguments on which it was founded. The extract, beginning with an account of the rocks on the eastern slope of the Snake and Buck Mountains, is as follows:—

“The general geological position of the red rocks here spoken of is clearly seen by following either of the sections from the western base of the Snake and Buck Mountain across the trough or valley above described. Here we ascend through the various divisions of the Matinal series from the Trenton to the top of the Hudson River group as here defined, each marked by characteristic fossils, and all maintaining a nearly uniform eastern dip; and above the latter we find a series of red and greenish and gray sandstones and shales of great thickness, succeeded, where the exposures are unbroken, by arenaceous and argillaceous reddish and gray limestones, alternating with beds of sandstone similar to that beneath.”

“Stratigraphically considered, this series of beds occupies the position of the Medina group of New York, or its equivalent the Levant series of Pennsylvania and Virginia. The sandstones and shales bear a close resemblance to those of the latter, not only in color, but in the profusion of fucoid-like markings which they display on some of the parting surfaces. The series of reddish and gray limestones which rest upon these massive arenaceous beds form an interesting feature in the geology of Vermont. Their alternation with layers of sandstone and shale, and their

frequently reddish tint, would lead us to regard them as a continuation of the lower mass under somewhat new formative conditions. In the prolongation of this belt of sandstones and limestones toward the north, as at Winooski Falls, near Burlington, the latter mass is seen to consist in great part of a pinkish white fine-grained limestone, which toward the base contains layers of reddish limestone interstratified with red sandstone, — marking the transition from the arenaceous to the calcareous form of deposit.”

“ In none of the localities of this calcareous mass which I have examined, from the flank of the Snake Mountain to near the Canada line, have I found any well-marked organic remains. This fact of itself strongly favors the idea of its being but a peculiar development of the upper portion of the Medina group. Nor can it be objected to this that metamorphic action may have caused its present destitution of fossils. Throughout nearly the whole of the series of exposures extending due north toward the Canada line, it presents a gentle eastern dip, conforming to the subjacent fossiliferous beds of Matinal limestone and slate, from which it is separated only by the sandstones above described. From this we infer that it must have been as little exposed as these fossiliferous beds to agencies capable of obliterating its included fossils, and that therefore it has never been in any considerable degree a fossiliferous mass.”

“ We are further strengthened in the opinion that this calcareous group, with the subjacent sandstone, belongs to the Medina period, by the consideration that the Clinton group, with which it might otherwise be compared, is almost everywhere an eminently fossiliferous one. From Alabama to northern New York, it is marked by an abundance of fossils. According to Mr. Logan, strata of this age are found in the vicinity of Lake Memphremagog, and, although there surrounded by metamorphic masses, they include a number of fossils in good preservation.”

“ On the whole, therefore, I think that the limestone and subjacent sandstone of which we are now treating must be regarded as one formation, and may with the highest probability be referred to the period of the Levant rocks or the Medina group of New York.”

Dr. White exhibited a section of the tusk of an ele-

phant, formerly presented, as an example of the growth of *osteo-dentine*.

The tusk of the elephant is composed of a thin outer layer of enamel, and the peculiar modification of dentine known as ivory, characterized by the minute size and remarkable curvatures of its tubes. The tooth grows in length by continual deposition, from the cone of matrix within its base, of the enamel and dentine; occasionally, however, in old animals a thin deposit of nodules of *osteo-dentine* is found within this cavity, the last effort of the dentinal pulp. Injury appears to produce the same result, as was seen in the specimen, which illustrated the effect of the passage of a large wrought-iron musket-ball through the dentinal pulp from side to side. The ball entered probably the thin socket formed by the prolongation of the premaxillary bone, breaking through the thin wall of the tusk, through the tender pulpy cone, and the tooth wall of the other side, and spent its force against the interior surface of the socket on the opposite side; it then fell back within the soft hollow it had formed, and became imbedded in the new growth it excited. In time it was undoubtedly carried forward by the growth from the base, until it perhaps cleared the socket. He inferred that the wound was thus made, on account of the large cavity still unfilled by deposition of tooth-matter from the pulp. The course of the ball was marked by a hollow cylinder of *osteo-dentine* deposited about its track; the inner layer of ivory was driven in by the force of the ball, and the efforts of the matrix never recovered their normal direction, for not only was its secretion deposited in irregular layers and masses, but its nature was perverted, and *osteo-dentine*, instead of ivory, was ever afterward its product.

Prof. W. B. Rogers explained the laws of fracture of a thick glass tube, exhibited by U. A. Boyden, Esq.

A thin tube would fracture in a spiral manner, the result of the circular and longitudinal tendencies to break; in a thick tube, there is a third tendency to fracture from the centre to the periphery; if this be combined with the other two, the resultant is the imbricated fracture observed in the specimen.

Prof. Agassiz made a communication on consecutive faunæ and their corresponding number of geological formations, as furnishing arguments against the theory of Darwin.

He believed that the number was considerably greater than had been hitherto admitted. He objected to the use made of the great and well-known changes in animals under the influence of domestication, as an argument in favor of similar probable changes in geological ages; the genera of these domesticated animals, as *bos*, *canis*, &c., lived ages before the human period, but their remains show no such changes as now occur; these are two distinct series of facts, and are not comparable. The representatives of these faunæ differ specifically, and do not pass from one to the other, and this is true from the most ancient to the most recent periods. He defined faunæ as groups of animals enclosed within circumscribed areas; there are many of these on the globe, and they must not be confounded with zoölogical realms; of the latter, New Holland may be mentioned as an example, having animals of a peculiar type; so are the East Indies, Africa south of the Atlas Mountains, America from the sub-arctic regions to Patagonia, and the arctic regions themselves. Faunæ, on the other hand, occupy more limited provinces characterized by species related to each other, as they are more largely in realms. Faunæ differ in various parts of the world, and no one can be taken as a type of existing creation; for instance, the fauna of Canada differs entirely from that of Africa, and any zoölogist who should take one or the other or any single fauna as the type of the world's animals would commit an absurdity; yet geologists do this constantly in their identifications of geological periods, and of course fall into the gravest errors. He found fault with the methods of determining the limits of successive faunæ usually pursued by geologists; he thought that this order should be determined by the fossils; that the rocks should be regarded merely as the tombs of the fossils, that naturalists should try to find out the animals of an epoch, and establish the limits of faunæ on zoölogical and not on physical principles. He made use of the strata of New York State, as being well ascertained, in his determinations of the primary groups of faunæ. The lower and upper Silurian

and the Devonian he divided into several faunæ, according to Prof. Hall, many of which he had satisfied himself from examination of their fossils were distinct; these answered, as a general rule, to the subdivisions or groups adopted by Profs. H. D. and W. B. Rogers in their "Geology of Pennsylvania and Virginia;" the faunæ of the Devonian he had not as yet been able to determine; he would characterize the primary up to the carboniferous as being composed of exclusively marine faunæ, as the age of fishes.

In the carboniferous age marshy land appeared, the beginning of continental lands with inland waters. In the tertiary, according to Mr. Lyell, 4 or 5 per cent. of the eocene species pass on to the present period, 19 per cent. in the miocene, and about one half in the pliocene; this he regarded as an error which would not have been committed with a sound zoölogist by his side. He instanced *Rostellaria fissurella*, which had been considered identical in several formations, as being easily recognized to embrace distinct species on actual comparison of the specimens. He objected to Deshayes's principle of requiring equal and great differences in the determination of species, as what would constitute a specific difference in one case might be far greater than that required in another. The mastodon and *Elephas primigenius* are acknowledged to be extinct, and he saw no reason why other classes in the animal kingdom should not be exterminated by the same causes; he was convinced that careful examination would show that the lowest mollusks in the tertiary beds are as different from the present as are the larger animals.

Prof. Rogers replied that the entire severance of these faunæ must be demonstrated, before such a line of reasoning can be employed against the theory of Darwin; if such a distinction be true, we must abandon nearly all the hitherto accepted specific determinations of other accomplished zoölogists, most of whom maintain that animal forms do pass from one stratum to another. The division lines, moreover, are essentially local; the number of species said to pass from one formation to another may be so great in some localities as entirely to obliterate divisions which in other and not very remote places are marked by very sharp transitions.

Thus in New York, out of more than seventy forms found in

the strata below the upper limit of the Black River limestone, only three have been observed by Prof. Hall to pass up into the overlying Trenton limestone, and on the same horizon a transition almost as abrupt shows itself in parts of Pennsylvania and Virginia. Here then we would seem to be justified in drawing a strong line of separation between the contiguous Black River and Trenton faunæ. But turning to Canada, we find a very different distribution of the fossils. In this region the Black River limestone, that is, the rock containing the characteristic Black River fossils, includes a preponderating number of species found also in the Trenton. According to the Canada paleontologists, fifty-two out of seventy-five are common to both formations, and what is still more interesting, some Trenton species are found in the yet lower group of the Chazy. Here obviously we can no longer draw a limit between the Black River and Trenton faunæ, but must blend them gradationally into one.

A yet more striking instance of the essentially local nature of these lines of demarcation is seen in the corresponding group of formations in Tennessee, where, according to Prof. Safford, the upper Lebanon rocks are more strongly marked with a Black River fauna than the lower, thus in a measure *inverting* the succession of the fossil groups as compared with New York, and putting the Trenton fauna below a group which in New York would be called Black River.

So again in the passage from the Hudson River group to the overlying rocks, marked in New York and over much of the Appalachian area by evidences of great mechanical disturbance, we find the line of demarcation so strongly drawn that only a few species are continued into the next superior formations. This, therefore, has been well recognized as one of the most abrupt of all the transitions in our paleozoic geology; and yet toward the northeast, in Anticosti, where these evidences of physical movement are comparatively slight, we see the conglomerates and sandstones of the intermediate Levant or Oneida and Medina group replaced by limestones, forming beds of passage which contain some of the characteristic fossils of both the lower or Hudson River formation and the superior or Clinton group. Here, therefore, the lines of separation become so vague or so nearly obliterated as to make the proposed limitation of faunæ quite impossible.

Seeing, then, that faunæ are not unfrequently mingled in contiguous formations, that they do not hold the same precise geological level or vertical distribution at different localities, that they may even become inverted in relation to each other, offering in this and other cases evidence of emigration and remigration in successive times, Prof. Rogers maintained that the *precise and absolute limitation* of faunæ to formations, as advocated by Prof. Agassiz, if true in any case, is at best but of local and partial application, and can not be the basis of a paleontological arrangement of formations. Even according to the ordinary and much less stringent view of geological faunæ, it is found that only the few great divisional lines of the geological column are persistent over extensive areas, while the numerous subordinate ones, however distinct at the typical locality, lose themselves as they are traced, to give place to other modes of subdivision.

As regards the comparison of the tertiary fossils with corresponding modern forms, Prof. Rogers said that we had the authority of Say, Conrad, Deshayes, and indeed paleontologists in general, for the conclusion that a large number of the fossils found in the tertiary deposits are identical with existing species. Even supposing, however, that the fauna of the tertiary contains no such identical forms, it will be admitted that the likeness becomes extremely close as we approach the modern epoch, and this would seem to lend support to Mr. Darwin's doctrine of modification by natural selection. In regard to the discrimination of species, the question at last must come to this: What is the limit of specific difference? who shall be the arbiter? what the principle of distinction between species and variety, and what the guide in drawing the lines of demarcation of the successive faunæ?

Prof. Agassiz remarked that he did not expect the immediate reception of his views, though convinced that they were true, but believed that after mature examination of his facts they would be generally received. He mentioned the fossils of the Jura as an instance of the great change in the views on such subjects; according to Goldfuss, they are identical throughout the whole series, but they are now admitted to be different. He did not think that the increasing acknowledged differences point in any way to a gradation of species or to a confusion of animal forms,

but rather enable the naturalist to distinguish clearly his species. He alluded to chemistry, in which there was a time when platinum and other silver-like metals were not distinguished from silver; but in the progress of science they were ascertained to be separate and distinct species.

Prof. Rogers replied that this argument would answer equally well for the other side of the question; for instance, chemistry has reduced to one many supposed different species, as the diamond, plumbago, and carbon.

Dr. Bryant placed upon the table forty specimens of Brazilian birds mounted by himself, about half of them new to the cabinet, and some of them rare; from the collection presented by Dr. J. C. Reinhardt.

A letter from Mr. Charles W. Holman, requesting the Proceedings of the Society for the library at Westeras, Sweden, was referred to the Publishing Committee.

Mr. Charles F. Eschweiler, of Houghton, Michigan, was chosen a Corresponding Member, and Dr. George Russell, of Boston, a Resident Member.

March 21, 1860.

The President in the Chair.

Mr. Whittemore read a communication from Mr. James Lewis, of Mohawk, N. Y., on the colors of the nacre of freshwater bivalves.

In some sections of the country the nacre, ordinarily white, is colored, especially in the *Unios*; from experiments made on shells, he is inclined to believe that a minute trace of gold in the water may in some way be connected with the rich colors of the nacre of some *Unios*.

He also sent an account of some experiments on a new registering thermometer, in constructing which he prepared a bundle of rods of iron and brass wire (No. 13), equivalent to 45.8 inches of brass wire, antagonized by 45.8 inches of iron wire, on the principle of the compensated pendulum; these, connected with a series of levers and a dial for inspection, and a registering point, moving on parallel rods, actuated by clock-work, constitute the apparatus. The rates of expansion of brass and iron, as ascertained by his apparatus, do not agree with the rates given in the Reports of the U. S. Coast Survey. This opens the way to the suspicion that some of the "base lines" of the Coast Survey contain errors larger than may heretofore have been looked for. He graduated his dial according to the rates derived for the Reports, 93° for the whole circle; he found, in practice, that to agree with a mercurial thermometer his circle (dial) should read 120° . His communication was referred to Prof. Rogers to report upon.

Prof. W. B. Rogers explained his views of the stratigraphical relations of deposits formed in an ocean, under each of the three conditions of a *stationary*, a *subsiding*, and a *rising* position of the sea-bottom, illustrating the several results by drawings on the blackboard.

In the first and second of the conditions here named, the level of the resulting land would be *approximately horizontal*; while in the third case, that of the uplifting of the ocean-floor during the accumulation of the deposits, the surface would present a slope descending from the oldest deposits on the first shore-line to the strata latest formed; in other words, the *older deposits* would crop out at the *higher level*, and the successively later ones at a less and less elevation.

The Appalachian strata embraced between Lake Ontario and the Pennsylvania coal region present a relation of levels *the reverse of that last named*, the older strata cropping out at successively lower levels as we proceed northward, while the newer formations, the Devonian and Carboniferous rocks on the south, are piled up to a height of some thousands of feet above the level of these outcrops. For this and other reasons, Prof. Rogers could not admit the theory which regarded the present stratigraphical

features of this region as evidence of a deposition of the strata during a long-continued upward movement of the ancient sea-floor.

Another consideration opposed to this view is the *great aggregate thickness* of the marine deposits exhibited in the middle and southern portion of the Appalachian area, and the known fact that even the older and lower of these formations, where brought to view by anticlinal structures, present a composition and surface-markings bespeaking a comparatively shallow ocean at the time of their accumulation. As, therefore, the ancient sea of this region could have had no great depth at the commencement of these deposits, it seems clear that, in order to receive the whole series of more than twenty thousand feet of successive strata, its original floor, instead of rising during this period, must have undergone *an enormous amount of depression*.

Looking to the series of carboniferous rocks forming the upper portion of this vast succession of deposits in our Appalachian basin, the evidences of such a subsiding movement are too obvious to be questioned. Each of the nearly horizontal beds of vegetable matter forming an incipient coal-seam must have been deposited at or a little above the ancient sea-level, and must then have been depressed and covered in by sediments forming the sandstones and shales, often with marine fossils, which now overlie it. Thus, stage by stage, with long pauses, in which the materials of successively newer coal-seams were accumulating by vegetable growth, the sea-bed was depressed until it had received the entire thickness of the carboniferous rocks, with their included strata of coal.

On either hypothesis, that of a subsiding or of a rising ocean-bottom, the features of the land, as first presented on the completion of its formation, would be far from corresponding with its present topography. This existing configuration has undoubtedly been the work of subsequent denudation, of which extensive and unmistakable evidences are apparent throughout the paleozoic area. The theory of an uplifting movement during the deposition does not, as has been supposed, dispense with the necessity of such a further agency for remodelling the surface. On the contrary, in this case, the depth of denudation required to carve out the profile of the region in question, so as to make it

conform to the existing features, would be far greater than would be needed to bring the imaginary subsidence-area to a like agreement. In the latter conditions, the denuding force would be called on to remove only a certain amount of material below the horizontal surface over the northern portion of the tract; in the former, it would have first to cut down the greatly elevated outcrops at the north to bring them on a level with the southern deposits, and after this to do an additional amount of excavation equal to that of the other surface.

Admitting the validity of these arguments drawn from obvious mechanical and stratigraphical relations, we must conclude that the remarkable preservation of the paleozoic strata in the region referred to has been due to the subsidence which successively removed them in great part from the destructive effect of shore-action, sealing them down under an accumulation of overlying deposits. This preservation, therefore, is entirely consistent with the view of Darwin and other geologists, of the extensive destruction of deposits with their fossils, when, through an *uprising movement*, they are brought, stratum by stratum, within reach of the wasting and dispersing forces of the shore. It certainly affords no argument in contravention of that doctrine.

In maintaining that these paleozoic rocks were accumulated during a period characterized, on the whole, by a great aggregate subsidence of the ocean-floor, Prof. Rogers was far from supposing this movement to have been regular, or without pauses and reversals. He believed that the materials of the successive great formations bear intrinsic evidence of repeated *long pauses*, and that the transitional deposits are marked by the proofs of occasional, and perhaps frequent, *upward oscillation*. During these subordinate pauses and upward movements, themselves occupying periods of great absolute length, however small in comparison with the whole, we may well conceive that many extensive sheets of the previous deposits were disintegrated and dispersed, and we may fairly infer that the existing series of strata, with all their seeming fulness, are but an imperfect and fragmentary record of the life-history with which they are impressed.

Prof. Agassiz maintained that there was not subsidence during the deposition of the New York strata, and that the facts do not

indicate it; but rather an upheaval. Before the Potsdam sandstone there is no evidence of high mountains. During upheaval, there is dislocation at the junction of the beds, forming a series of abrupt vertical cliffs, as seen in the succession of the strata of New York; in the case of denudation, the surface would be a series of general curves, which is not the case in New York. During upheaval the level of the sea may be actually less, from the contraction of the earth's crust while cooling; in consequence of this contraction the ocean would always remain at a certain depth, sufficient for these depositions of thousands of feet of strata during the upheaval of the land. The study of the fossils, also, is opposed to the theory of subsidence and denudation, and we do not find those of the primary carried into the secondary beds.

Prof. Rogers replied that the subsidence of the ocean-bottom is equivalent to an increase between the bottom and the level of the sea; when this distance is increasing, the deposits are thereby sealed in by the subsequent deposits; when this distance is lessening, thereby successively exposing all the margins of the strata to the action of the surf, they are worn down and destroyed. The change of relative distance is the important point; how this is brought about is of little consequence to the present discussion. The perfect conformity and parallelism of the bank-like strata adverted to by Prof. Agassiz, and the terrace form, depend on the dip of the strata, and on the planes of cleavage being nearly perpendicular to the stratification; and the present aspect of these surfaces is continually changing.

Prof. Agassiz replied that, though of course these terraces have undergone great changes, he meant to convey the idea that they represented, to all intents and purposes, the original surface of the country.

Dr. Hayes submitted a letter from the interior of Liberia, Africa, in which the writer says that there is no occurrence there of native iron, as stated by him in Vols. V. p. 250, and VI. p. 279, of the Proceedings.

The piece there described was smelted by the tribe among whom the writer resided, who keep the art to themselves, as they

find the manufacture of iron very profitable, the product of their furnaces being held in high esteem by the neighboring tribes, as a tougher and more flexible iron than they can obtain from foreign countries. The furnaces consist of stacks of about six by five feet, and about seven feet high, with a flue in the centre about two feet long by nine or ten inches wide; the flue, passing to the bottom of the stack, is filled with layers of coal and ore, upon which they force a strong current of air by rude contrivances; nothing is allowed to escape but the dross, and a heavier brittle substance which they remelt in small furnaces; the iron is left to cool in the furnace, which gives it the appearance of ore, with large particles of dross adhering to it, much blistered in places, with very rough protuberances over much of its surface. Many of these furnaces, with their banks of dross, may be seen in the interior of the country. The color of the ore, mostly of mountain character, is between cherry and brownish red, like red iron-stone. He had seen pieces of fifty or sixty pounds, the result of one blast. They cut the mass when heated with their rude axes as they do wood, showing the good quality of the article. The ore is plentiful in most parts of the country, and of varying quality. The masses of iron are in many places sold as they come from the furnace, but in the interior it is forged into pieces resembling a "pudding-stick," which are used as a medium of exchange in commercial transactions in the markets and in private barter. Africa has doubtless all the iron required for her extensive wants, and dense forests for the manufacture of the coal to work it. Dr. Hayes wished, therefore, to correct the error in the statement that native iron exists in Africa, to which he had been led by its texture and chemical composition, which were unlike those of manufactured iron in containing quartz crystals and magnetic oxide of iron, with no traces of carbon or its compounds.

Prof. Agassiz continued his remarks on the subject of successive faunæ, of which he considered there were more than fifty, capable of as satisfactory proof in geological periods as at the present day, and at least ten more indicated.

His object at the present time was not to explain the origin and connection of faunæ; we must take them as we find them, as matters of fact, without reference now as to how they were produced. It is important in the discussion of this subject to bear in mind that some faunæ are strictly defined, while others run together; there is very great difference in this respect; Mr. Wallace, a strong advocate of Darwin's theory, admits the remarkable limitation between the Australian and Indian Archipelago faunæ, separated by a strait only fifteen miles wide, yet, with the exception of a few birds, entirely distinct. Faunæ are not necessarily, therefore, like each other because near together, nor unlike because widely separated; the former is shown by the case just cited, in which there is complete distinction, though circumstances favor a mingling of faunæ; on the other hand, those of widely distant Africa and the east coast of America between the tropics are very much alike. These do not look like migrations, which are at best limited, and in which, if the conditions of life were much changed, the animals would be destroyed; marine animals, in an element which invites migration, are very much circumscribed within limits as to depth of water, and could not migrate from one part of the world to another across ocean abysses. Another obstacle in the way of migration is the transfer of progeny; eggs in most animals cannot bear much change of temperature or of location, without destruction of the contained embryo. He would pursue a strictly zoölogical method, as in the comparison of living animals. Without discrediting the researches of others, he would simply examine their materials anew, with a new object in view; the usual investigations are too general and unsatisfactory, and their results not precise enough for use in the question of the origin and limits of species; the materials were not accumulated for this purpose, but for zoölogical questions in which identity, overlooking slight differences in species, might be assumed without leading to grave errors, and without sufficient examination. For instance, the animals of Europe and America, once considered identical, are now admitted to be different species on direct comparison. This is a purely zoölogical question; the older geological divisions are not coincident with zoölogical divisions and faunæ. In the carboniferous age, reptiles were the highest vertebrates. As to the limit between reptiles and fishes,

whether before or after the coal, by examination of the floras, and finding the Permian resembling the carboniferous, he would place the limit between the carboniferous and the Devonian at the old red sandstone; with the tertiary came in the reign of mammals, the marsupials having come in during the oölite.

In the number of species which he has used to characterize a distinct fauna, he has always taken into account the previously ascertained abundance of any fossils under consideration in other geological periods, and whether the family were in the ascendency or on the decrease at the period examined; without the elimination of errors which might arise from these sources, any observations would be of little value. In his mode of determining or identifying species, he always ascertains, if possible, whether they belong to a genus in which the species vary little or much, (as in the herrings in the former case, and the percoids in the latter,) and whether to a genus in which there are or are not great differences in size.

In regard to the vitality of eggs, the President remarked that it is well known that the eggs of salmon and trout are sent by *diligence* all over France; and Prof. Rogers observed that the flight of most birds would enable them to multiply on both sides of a narrow strait like that alluded to.

Mr. Theodore Lyman presented the following descriptions of new *Ophiuridæ*, belonging to the Smithsonian Institution and to the Museum of Comparative Zoölogy at Cambridge.

OPHIOTHRIX, (Müll. & Trosch.)

Ophiothrix dumosa, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 11.5 millim. Length of arm, 72 millim. Teeth 6, cutting edge a little rounded; squarish, thick; sometimes split in two; upper one rather narrower and more tapering. Tooth-papillæ about 38, arranged in two diverging, principal rows, between which are included some smaller ones; these two rows are vertical, and start, just below the teeth, with a pair of stout papillæ, like a tooth split in two. Mouth-shields oval heart-shaped, with a de-

cided peak inward; length to breadth, 1.3:1.8. Side mouth-shields rather narrower than is common in the genus; meeting within. Under arm-plates much broader than long, hexagonal, with angles more or less rounded; first four plates smaller than those beyond, and much more rounded; most of the plates on the first third of the arm are hexagonal, with pretty acute angles; their outer side sometimes a little reënteringly curved; length to breadth, (12th plate,) .7:1.2. Upper arm-plates diamond-shaped, with inner angle truncated; lateral ones usually acute, and outer one more or less rounded; on the median line a ridge. Length to breadth, (5th plate,) .7:1.3. Brachial and interbrachial rays of disc closely beset with stout spines of several sizes, most of them long: the longest, 1.7 millim., the shortest, .3 millim. There seem to be no such short spines, bearing a crown of slender thorns and remaining permanently small, as in *O. spiculata*, but the smaller spines seem only partly-grown large ones; the largest are stout and round, and have rows of five or six thorns on their sides; they usually end in three blunt thorns; the smaller ones are usually very thick at the base, but above the first thorn grow suddenly smaller, and taper to a somewhat blunt, thorny end; they have rows of three or four thorns on their sides; the smallest spines are little stout cylinders, ending in a conical clump of nine or ten short thorns; rarely this clump has an even top, and not more than six thorns. Radial shields nearly bare, with only a few spines on their sides and inner ends; outer ends touching each other; length to breadth, 3.2:1.6. Spines on interbrachial spaces below more slender and scattered, not extending quite to the mouth-shields. Arm-spines rounded and stout at their base, tapering regularly to a blunt point; but little flattened; ending in a crown of short, blunt thorns; 13th joint, 8 spines; lengths to that of under arm-plate, 3.5, 2.2, 2.5, 2.5, 1.8, 1.5, 1, .6: .7. Upper spine always longest and stoutest, with rows of about twenty-four small thorns on its sides; it sometimes attains a length of 4.5 millim. Tentacle-scales usually much larger than are commonly found in the genus. Color, in alcohol: above, disc dull cobalt blue, approaching lead color; radial shields lighter, with several large dark spots; upper arm-plates pale bluish, with a darker spot on each side; arm-spines dark at tips; below, interbrachial spaces similar to upper surface;

mouth-shields and under arm-plates irregularly edged and spotted with dark blue.

Variations. Another specimen had but few of the longest spines on the disc, most of them being of the second or of the smallest size; the radial shields had no distinct spots, and the under arm-plates were mostly bright blue. The side mouth-shields sometimes do not meet within.

This species differs from *O. spiculata*, *O. violacea*, and *O. angulata* in the armature of the disc, which is coarser and of a different character; the two latter species, also, are smaller.

San Diego, Cal. Mr. Cassidy.

Smithsonian Institution, No. 1049.

Ophiothrix magnifica, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 12.5 millim. Length of arm, 70 millim. Tooth-papillæ about 36, in two vertical, diverging rows of about 10 papillæ each, filled in between with smaller papillæ. Teeth 6, with a squarish cutting edge; rather thick; uppermost one thinner, and tapering almost to a sharp point. Mouth-shields small, almost circular; length to breadth, 1:1.2. Side mouth-shields meeting within. Under arm-plates irregular oval; closely joined to each other, and covered with thick skin, so that their outlines are indistinct; length to breadth, .7:1.3. Upper arm-plates small, with a strong median ridge; diamond-shaped, with the outer angle strongly rounded; length to breadth, (13th plate,) .7:1.2. Brachial and interbrachial rays closely beset with round, stout, tapering spines, of very even length; they are covered with minute thorns, and terminate in a crown of the same; these spines have usually a length of 1.3 millim. Radial shields bearing only a few small spines; length to breadth, 3.5:1.7. Arm-spines stout, rather blunt, rounded, slightly and regularly tapering, bearing many small thorns, and deeply corrugated lengthwise; second and third spines usually longest and stoutest; 11th joint, 8 spines; lengths to that of under arm-plate, 2.4, 2.6, 3.1, 2.1, 2.1, 1.5, .9, .5:.7. Tentacle-scales distinct, flat, rounded at their outer end. Color, in alcohol: above, disc dull indigo blue; arms the same, but banded with lighter, usually two or three joints to each band; arm-spines faint blue; below, under arm-plates variegated with cross-lines

and specks of white and darker and lighter blue, giving the arm a banded appearance.

Variations. The general color may incline more to greenish blue, or to purplish blue; and the markings of the under arm-plates may form more or less distinct bands. The largest specimen had a disc of 14 millim., and some of the spines on the disc were as long as 2.1 millim. Many of the arm-spines were tipped with white.

This very beautiful *Ophiothrix* belongs to the group which has only long spines on the back of the disc; these are shorter and stouter than in *O. Örstedii* or *O. Suensonii*, both of which, moreover, are smaller species.

Peru. C. H. Raymond.

Smithsonian Institution, No. 1043.

OPHIURA, (Lamk. non Forbes.)

Ophiura Holmesii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 19.2 millim. Length of arm, about 74 millim. Mouth-papillæ 16 to 18; outermost one largest; next one to outermost broad and flat; the rest rounded, tapering, pointed. Teeth 4, uppermost one longest and sharpest; the others thin and flat, with a rounded cutting edge. Mouth-shields long heart-shaped, the point inward; a slight indentation on outer edge; length to breadth, 1.8:1.6. Side mouth-shields small, thickened, rounded triangular. Under arm-plates squarish; outer side curved, lateral sides a little reënteringly curved, inner side and inner laterals of about equal length, and lying nearly in one line; further out on the arm the plates are more octagonal; length to breadth, (5th plate,) 1.2:1.6. Upper arm-plates much broader than long; inner side a little shorter than outer; length to breadth, (4th plate,) 1.2:3.2. Granulation of disc pretty close and regular, about 180 grains to a square millim. Scales at the bases of the arms completely covered by granulation. Arm-spines stout, flattened, somewhat rounded, varying little in size; upper ones sometimes a little the longest; 8th joint, 9 spines; lengths of uppermost and lowest to that of lower arm-plate, .8, .8:1.2. Tentacle-scales as usual in the genus. Color, in alcohol: disc, above, with a dirty white

patch in the centre; rest of upper surface having a ground tint of light, yellowish brown, slightly clouded with olive; arms, above, dirty white, irregularly barred with yellowish brown, each bar usually including two or three joints; lower surface of disc and of arms uniform dirty white, with a brown tint just on edges of disc.

Variations. According to drawings in possession of Prof. Agassiz, the color is almost as variable as in *O. appressa*. A common pattern is a dark green disc with a blotch of white in the centre, and arms banded with darker and lighter green. Specimens with a disc of 14 millim. have the lower arm-plates proportionately longer and more octagonal.

This species resembles both *O. brevispina* and *O. olivacea*, but is larger than either, 20 millim. being about an average for the disc of an adult; it is further distinguished from the former by stouter arms and the different proportions of the lower arm-plates, and from the latter by barred arms and varied coloration.

Charleston, South Carolina. Prof. Agassiz and Prof. F. S. Holmes.

Museum of Comparative Zoölogy, Cambridge.

OPHIOCOMA, (Agas.)

Ophiocoma Alexandri, (Lyman.)

Description of a Specimen. Diameter of disc, 17 millim. Length of arm, 120 millim. Mouth-papillæ flat, rounded, of nearly equal size, rather small; 9 or 10 to each angle of mouth. Tooth-papillæ about 9, crowded, bead-like, most of them in two vertical rows. Teeth 3 or 4, stout, flat, a little tapering. Mouth-shields nearly round, with inner end slightly truncated; length to breadth, 1.6:1.6. Side mouth-shields very narrow and small, occupying the inner portion of the mouth-shield, but not meeting within. Under arm-plates very regular; not overlapping; rounded octagonal; inner angles less rounded than outer ones; the plates within the disc a good deal smaller than those beyond; length to breadth, (20th plate,) 1.2:1. Upper arm-plates regular, oval heart-shaped, with the point inward; length to breadth, (9th plate,) 1.2:2.2. Grains of disc, under the microscope, like very short, blunt spines, about 25 to a square millim., of the

same character below, but less numerous. Arm-spines 5, robust, rounded, somewhat flattened, a little tapering, blunt; third spine from the top longest; the longest spines are near the 20th joint; lengths to that of under arm-plates, (18th joint,) 2, 2.2, 2.7, 1.8, 1.5:1.2; two lowest spines more slender than the upper ones. Sometimes a short, supplementary spine above. Longest spine on this specimen, 3.2 millim. Close to the disc there are often 6 spines, which, however, are smaller than those beyond. Tentacle-scales large, rounded oval; on first two or three joints 2, on the rest only 1. Color, in alcohol: above, disc uniform gray brown; arms yellowish brown, barred with darker; some of the upper arm-plates finely marbled with lighter; below, several shades of light brownish yellow; a light brown stripe running along the lateral sides of the under arm-plates.

Variations. The pattern of the color varies little, but the ground tint may have more of yellowish gray or of brown. The proportions of arms to disc vary from about 5 to 9 times, according to age and other circumstances. Very large specimens have the disc 22 millim. in diameter, and 6 or 7 spines on most of the arm-joints. A young one had 4 arm-spines and only 2 tooth-papillæ; the disc was covered with imbricated scales and only a few large grains; the disc was to the arms as 3.2:22.

O. Alexandri was first received from my friend, Mr. Alex. E. R. Agassiz, after whom I have named it. It resembles *O. pumila*, but differs in having the 3d (or 4th) arm-spine much longer than the rest.

Acapulco, West Coast of Central America. Alex. E. R. Agassiz.

Museum of Comparative Zoölogy, Cambridge.

Cape St. Lucas, Lower Cal. J. Xantus.

Smithsonian Institution.

ADDITIONS AND CORRECTIONS.

Ophiura tores has radial shields until it attains a considerable size. The specimens before described (page 198) were very large, and had the disc completely covered with grains. Four smaller specimens, since received, three from Mr. A. E. R. Agassiz, at Panama and Acapulco, and one from Mr. Xantus, at Cape St. Lucas, all had radial shields. The largest of these had a disc of

29 millim., and arms of 100 millim. The smallest had a disc of 14 millim., and arms of 35 millim.; there were 7 or 8 arm-spines; most of the upper arm-plates were broken in only two pieces; the color was very dark umber, with fine, sinuous, black lines on the disc.

Ophiura brevispina (Say) is unquestionably a true *Ophiura*. According to the original description, it must be a brittle-star without radial shields, (this excludes *O. cinerea*, *O. rubicunda*, and *O. squamosissima*;) with arm-spines of equal length, (which throws out *O. elaps*;) with undivided upper arm-plates, (it cannot then be *O. guttata*;) with only 7 arm-spines, and the sides of the disc "concavely arched," (which eliminates *O. brevicauda*;) there remains therefore only *Ophioderma* (*Ophiura*) *serpens*, (Ltk.) which agrees well with Say's description, and is found abundantly in Florida. In future, therefore, *Ophioderma serpens*, (Ltk.) must fall among the synonymes of *Ophiura brevispina*, (Say.) It is satisfactory to know that all of Say's *Ophiuridæ* have now been identified. They stand thus:—

SAY'S NAMES.	PRESENT NAMES.
<i>Ophiura angulata</i> , (Say.)	<i>Ophiothrix angulata</i> , (Ayres.)
<i>Ophiura elongata</i> , (Say.)	<i>Amphiura cordifera</i> , (Lyman.)
<i>Ophiura crassispina</i> , (Say.)	<i>Ophiocoma crassispina</i> , (Ltk.)
<i>Ophiura reticulata</i> , (Say.)	<i>Ophionereis reticulata</i> , (Ltk.)
<i>Ophiura brevispina</i> , (Say.)	<i>Ophiura brevispina</i> , (Say.)
<i>Ophiura appressa</i> , (Say.)	<i>Ophiura appressa</i> , (Say.)
<i>Ophiura paucispina</i> , (Say.)	<i>Ophiolepis paucispina</i> , (Ltk.)
<i>Ophiura isocantha</i> , (Say.)	<i>Ophiostigma isocantha</i> , (Ltk.)
<i>Ophiura flaccida</i> , (Say.)	<i>Ophiomyza flaccida</i> , (Ltk.)
<i>Ophiura cirrosa</i> , (Say.)	<i>Asterochema oligactes</i> , (Örsted.)

Dr. Lütken agrees with me in my identification of *Asterias cordifera* (Bosc,) (see page 203,) and wishes to change the name *Amphiura cordifera* (Ltk.) to *Amphiura Riisei*, (Ltk.)

OPHIONEREIS, (Lütken.)

Ophionereis Xantusii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 7.7 millim.

Width of arm, without spines, 1.2 millim. Length of arms, 40 millim. Mouth-papillæ 10 or 11 to each angle of the mouth, small, rounded, somewhat flattened. Teeth 4, thin, flat, squarish; lowest one thicker, and with a rounded cutting edge. Mouth-shields much rounded, heart-shaped, with narrow end inward; length to breadth, 1 : .9. Side mouth-shields short, triangular, widely separated within. Under arm-plates squarish, a little longer than broad; outer side slightly curved, lateral sides a little reënteringly curved; length to breadth, (17th plate,) .5 : .4. Upper arm-plates triangular, with a rounded angle directed outward, and a sharp angle directed toward each side; length to breadth, (11th plate,) .5 : .9. Supplementary pieces as long as the joints, triangular, with the outer side curved. Disc-scales very close and fine; about 200 to a square millim. Radial shields very small and narrow; about .7 millim. long. The usual comb of papillæ along the genital slits is not much developed. Arm-spines 3, rather short, and flattened; cut off square at the end; middle one longest; lengths to that of under arm-plate, (17th joint,) .7, 1.2, .9 : .5. Tentacle-scale 1, large, round, thin. Color, in alcohol: disc faint greenish gray, finely lined with brownish; above the base of each arm a dark purple fork, of two converging lines; sometimes a few other veins of dark purple; arms brownish straw-color, with a faint, broken line of whitish running lengthwise; at intervals of from 5 to 12 joints, a dark purple joint, making a cross-band; below, interbrachial spaces same as upper surface; other parts light straw-color.

Variations. The dark markings at the base of the arms may differ somewhat in shape and size; and the arm-bands may go entirely round, or be confined to the upper surface. A small specimen, with a disc of 4.2 millim., had arms of 22 millim. The number of disc-scales to a square millim. was about the same as in the larger ones. The lower arm-plates were longer and more concave on their lateral sides; the teeth had all rounded cutting edges; the spines were more rounded and tapering than in the adult; the radial shields could hardly be distinguished. The mouth-shields vary a little, in being more or less rounded.

O. Xantusi differs from *O. annulata* in having shorter and blunter arm-spines, and shorter arms; the color also is different; from *O. reticulata* in blunter arm-spines, shorter arms, and a different pattern of color.

Smithsonian Institution.

Cape St. Lucas, Lower Cal. J. Xantus.

Ophionereis porrecta, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 12 millim. Width of arm, without spines, 2.5 millim. Length of arm, 113 millim. Mouth-papillæ 10, short, stout; the outermost but one broadest. Teeth 4 or 5, stout, squarish, rather long, a little tapering, lowest one shortest. Mouth-shields oval; length to breadth, 1.6 : 1. Side mouth-shields very small, triangular; sometimes almost obliterated. Under arm-plates squarish, broader without than within; outer side curved, inner side nearly straight, lateral sides reënteringly curved; length to breadth, (20th plate,) 1 : 1.2. Upper arm-plates varying in proportionate breadth, according to the width of the arm; usually broader than long; inner side much longer than the outer; outer and lateral sides often confluent in a common curve; length to breadth, (35th plate,) 1 : 1.6. Scales of disc rather stouter than usual in the genus; about 80 to a square millim. Radial shields, 1.2 millim. long. Scales on edge of disc larger than the rest. Papillæ along edges of genital slits stout and prominent. Arm-spines 3, short, rounded, tapering; lengths to that of under arm-plate, (23d joint,) 1, 1.7, 1.3 : 1. Tentacle-scale 1, oval, large. Color, in alcohol: above, disc minutely mottled and lined with dull reddish brown and dirty white; arms the same, but darker, with here and there a lighter joint; arm-spines pale brown, with one or two darker rings; below, interbrachial spaces tawny brown; mouth-parts and under arm-plates white, with specks of several tints of brownish.

Variations. A young one, with a disc of 3 millim., had arms 18 millim. long. The disc-scales were large; about 40 to a square millim.; and, among them, the primary plates could plainly be seen; the radial shields were conspicuous, though small, and were separated by a wedge of two or three scales; the upper arm-plates were nearly circular, and overlapped each other; the under arm-plates were shield shaped, having an angle within, and a wide, straight, outer side, and were entirely separated by the encroachment of the side arm-plates. The coloration varies chiefly in intensity.

The locality of these specimens has unfortunately been lost;

but they are believed to be from the Atlantic coast of America. The species is distinguished from others by the great length of the arms, the shortness of the arm-spines, and the general robustness of the structure.

Florida?

Museum of Comparative Zoölogy, Cambridge.

ΟΡΗΙΟΦΟΛΙΣ, (Müll. & Trosch.)

Ophiopholis Caryii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 8 millim. Width of arm, without spines, 1.5 millim. Length of arm, 26.5 millim. Mouth-papillæ flat, rounded, scale-like; 3 or 4 on each side. Teeth about 11, broad, short, stout, flat, square; uppermost and lowest ones narrower than those in the middle; uppermost one longest, with a rounded cutting edge; lowest one often split in two. Mouth-shields small, irregular, usually rounded rhomboidal; length to breadth, .6 : .8. Side mouth-shields large, nearly meeting within, curved; closely soldered with surrounding parts. Under arm-plates a little separated, squarish, with curved lateral sides; outer side a little reënteringly curved; inner side made up of three short lines; length to breadth, (8th plate,) .7 : .6. Upper arm-plates irregular oval, with outer side most curved; length to breadth, (3d plate,) .6 : 1. Supplementary pieces irregular, but usually oblong and angular; near the base of the arm, usually 8 or 9 to each plate. Near end of arm the upper arm-plates are nearly round, but they still have 8 or 9 supplementary pieces. Disc, above, closely and perfectly covered with small, rounded grains, about 100 to a square millim.; below, inter-brachial spaces closely beset with very short, stout, sharp spines, about 1 millim. long. Arm-spines 5, sometimes 6; short, stout, blunt, more or less flattened; three upper ones largest; 2d spine stoutest and broadest of all; lowest two smaller and more conical; lengths to that of under arm-plate, (8th joint,) .5, .5, .5, .4, .3 : .7; near tip of arm, spines more rounded and tapering. Tentacle-scale 1, thin, flat, narrowest at the base; cut off square at the end; about as long as the lowest arm-spine. Color, in alcohol: above, nearly uniform lake pink, a little deeper near edges of disc; along arms, a faint, broken line of lighter; below, inter-

brachial spaces near edge of disc same as upper surface, but fading to nearly white near the mouth; under arm-plates and mouth-parts white, the former edged with reddish along their lateral sides; side arm-plates and arm-spines same as upper surface, but lighter.

Variations. A young one, with a disc of 2.7 millim., had arms 7.6 millim. in length; the color was mottled, pink and white; the disc was pretty closely covered with grains, or very short spines, each bearing a crown of three little thorns; the arm-spines were rounded and conical, but not at all flattened. Another specimen had a disc of only 2.2 millim., and arms of 8.1 millim.; this one had all the supplementary pieces of the upper arm-plates covered with minute thorns. The smallest specimen had a disc of 1.9 millim., and arms of 5.4 millim. The disc granulation, arm-spines, mouth-papillæ, and supplementary pieces of the arm-plates, were all thorny. Arm-spines 5; mouth-papillæ 2; lower arm-plates longer than broad, narrowest within, with a reëntering curve on the outer side and a notch on the inner; upper arm-plates longer than broad.

This small species is distinguished from *O. Kennerlyi* and *O. aculeata* by having the disc *entirely* covered with fine grains, without naked plates.

San Francisco, Cal. T. G. Cary.

Museum of Comparative Zoölogy, Cambridge.

Prof. Agassiz observed that among starfishes lately received from Acapulco was a *Pygorhynchus*, found living there in abundance,—the genus being before known only in the fossil state; this would enable the structure of this animal to be definitely made out.

Dr. White called attention to a fine specimen of the skull of a hippopotamus, recently purchased for the Society by subscriptions obtained by Dr. S. A. Green from Messrs. James M. Barnard, J. N. Borland, William R. Lawrence, A. A. Lawrence, and James Lawrence, to whom the thanks of the Society were voted.

The Corresponding Secretary read the following letters, viz :—

From Charles W. Holman, New York, February 28, asking for the Proceedings for the library at Westeras, Sweden; Bibliothekariat der K. Bayerischen Akademie, October 1, 1859, presenting various publications; John Evans, Washington, January 18, Alpheus S. Packard, Jr., Brunswick, Me., January 19, Theodore N. Gill, Brooklyn, N. Y., January 23, and Edward Norton, Albany, March 16, accepting Corresponding Membership; William J. Sloan, Surgeon U. S. A., Santa Fe, New Mexico, February 14, proposing to establish relations between the Society and the Historical Society of New Mexico.

On motion of Mr. Binney, a committee was appointed to take into consideration the subject of an Annual Address before the Society in May next. The President appointed Messrs. Binney, Lyman, and White the Committee.

Messrs. H. Farnum Smith, F. C. Ropes, and Augustus Lowell, all of Boston, were chosen Resident Members.

DONATIONS TO THE MUSEUM.

January 4, 1860. Three fossil corals from Canada, near Niagara Falls; by Dr. H. Bryant. A forked-tailed humming-bird (*Mellisuga Langsdorfi*, Vieill.); by Mr. Charles L. Flint. The humerus of an albatross; by Mr. Kilby Page.

January 18. Lower jaw of a sperm whale, sixteen feet in length; by Mr. F. W. Choate, of Beverly, Mass. An annelid (*Nereis*) from the Grand Bank of Newfoundland, and rounded balls of iron pyrites from Newfoundland; by Capt. N. E. Atwood.

February 1. Dried and inflated lungs of a snapping-turtle, and a frog intermediate between the imperfect and perfect animal; by Mr. John Homans, Jr. Two teeth of the sperm whale; by Mr. William P. Anderson, of Roxbury, Mass.

February 15. Several freshwater fishes, crustaceans, and mollusks from the Sandwich Islands; two marmoset monkeys from Brazil; a malformed foetal dog; a noddy tern; a gecko and reptilian egg from Lahaina; skin and viscera of a New Zealand mocking-bird (*P. Nova Zeelandica*, Gmel.); by Dr. C. F. Winslow. Section of an elephant's tusk, in which an iron musket-ball was imbedded in a

canal of osteo-dentine; by Mr. Joseph L. Bates. Three teeth of the sperm whale; by Mr. Thomas M. Devens, of Charlestown, Mass. Skull of a beaver, from Lake Superior; by Mr. J. S. Fay. Saw-billed humming-bird (*Grypus nescius*, Dumont), and the military manakin (*Pipra militaris*, Shaw); by Mr. Charles L. Flint.

March 7. Two birds of Paradise (*Paradisea apoda*, Linn.); by Mrs. Joseph Coolidge. A woodpecker; by Mr. J. M. Forbea. Nests of the yellow-rumped warbler (with egg), and the red-eyed and yellow-throated vireos; by Mr. H. A. Purdie. *Paradozides Harlani* from St. Mary's Bay, Newfoundland, and a piece of birch tree gnawed by beavers; by Mr. Smith McKay, of St. Johns. Skulls of a horned owl, spotted tortoise, and brown bat, and thirteen teeth of the alligator; by Dr. H. Bryant. Tooth of sperm whale; by Dr. B. S. Shaw. Skull, sternum, and trachea of noddy, and large spider from the Falkland Islands; by Dr. C. F. Winalow. Digestive apparatus and heart of the fox shark, and of the gray shark, (*Odonaspis griseus*); by Dr. D. H. Storer. Bituminous earth from Brazil; by Mr. A. M. Edwards, of New York.

March 21. Skull, with lower jaw, of a very large hippopotamus; by Messrs. J. M. Barnard, J. N. Borland, Wm. R. Lawrence, A. A. Lawrence, and James Lawrence. Skeletons of opossum, squirrel, and turtle; twelve skulls of mammals, nine of birds, four of turtles, two of fish, with the hyoid and ear bones of man, and other bones; by Dr. S. Kneeland, Jr. Section of the trunk of a very large and rapidly-grown black Italian poplar, to show the annual rings, from Lowell, Mass.; by Mr. G. B. Emerson.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1860.

Catalogue of Astor Library. M-P. 8vo. New York, 1859. *From the Librarian.*

Phycologia Australica. Nos. 9 to 22. By W. H. Harvey, M. D., &c. 8vo. London, 1858-9. *From Dr. E. D. Greene.*

Description Géologique et Minéralogique du département du Bas-Rhin. Par M. A. Daubrée. 8vo. Strasbourg, 1852. *From the Author.*

Notes on the Aurora of the 28th of August. By Prof. W. B. Rogers. 8vo. Pamph. Edinburgh, 1860. *From the Author.*

Saggio di Ditterologia Messicana, di L. Bellardi. Parte 1. 4to. Torino, 1859. *From the Author.*

Descriptions of New Species of Fossils. By J. H. McChesney. 8vo. Pamph. Chicago, 1859. *From the Author.*

Edinburgh New Philosophical Journal. Vol. X. No. 2, for October, 1860. *From Prof. H. D. Rogers.*

Proceedings of the American Antiquarian Society. October, 1859. 8vp. Pamph. *From the American Antiquarian Society.*

Memoir on the Salubrity of the Isle of Pines. By Don J. de la Luz Hernandez. 8vo. Pamph. Habana, 1857. *From the Author.*

Address by Richard Owen, M. D., &c., to the British Association. 8vo. Pamph. *From the Author.*

Letter of Mr. Wallace on the Geographical Distribution of Birds. 8vo. Pamph. *From the Editor of the "Ibis."*

Report of the Superintendent of the Coast Survey for 1858. 4to. Washington. *From Prof. A. D. Bachs.*

L. Bellardi. Description des Cancellaires Fossiles des Terrains Tertiaires du Piémont. Pamph. 4to. Turin, 1841. *From the Author.*

P. Nisser. Geological Distribution of Gold. 12mo. Pamph. Melbourne, 1859. *From the Author.*

Catalogue of Recent Marine Shells, on the Coasts of North and South America. By J. D. Kurtz. 8vo. Pamph. Portland, 1860. *From the Author.*

Der Zoologische Garten. No. 1, Vol. 1. Edited by Dr. D. F. Weinland. 8vo. Pamph. Frankfort, 1859. *From the Editor.*

Arctic Boat Journey. By I. I. Hayes. 12mo. Boston, 1860. *From the Author.*

Annual Report of the Geological Survey of the State of Wisconsin. 8vo. Pamph. Madison, 1858. *From E. Daniels.*

Observations on the Genus *Unio*. By Isaac Lea. Part 2. Vol. 7. 4to. Pamph. Philadelphia. *From the Author.*

Descriptions of *Unionidae*, &c. By Isaac Lea. 8vo. Pamph. Philadelphia, 1860. *From the Author.*

Report on the United States and Mexican Boundary. By Major W. H. Emory. Vol. 2. 4to. Washington, 1859.

Pacific Railroad Survey. Vol. 10. 4to. Washington. *From Hon. Charles Sumner.*

Synopsis of Freshwater Fishes of Trinidad. By Theo. Gill. 8vo. Pamph. New York, 1858.

Description of a New Generic Form of *Gobinæ* from the Amazon River. By the same. 8vo. Pamph.

Description of New Species of Genus *Cypresæ*, (Linn.) By the same. 8vo. Pamph. *From the Author.*

Forhandlinger ved de Skandinaviske Naturforskeres Syvende Møde. 1. Christiania den 12-18 Juli, 1856.

T. Kjerulf. Das Christiania-Silurbecken. 4to. Pamph. 1856.

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April 4, 1860.

The President in the Chair.

Prof. Agassiz alluded to the theory of Prof. Rogers on subsidence and denudation as ingenious, and capable of explaining the facts in the case, but did not see indications of these two phenomena, nor any proofs of such extensive denudation as is required by it.

He exhibited a series of fossils to show the distinctness of faunæ, explaining why it is not always correct to identify geological periods by the identity of fossils; two questions are involved in the examination of this subject, one that of time or of period, the other that of space or limitation of faunæ.

Preliminary to the principal topic, he stated that he knew no such thing as a variety in the animal kingdom, except such as are stages of growth, within the limits of species; he instanced as an example one of the meandrine corals (*Manicina*), and other polymorphous types, which come within this law; in 1200 echini which he had examined and carefully studied, he had not found a single variety which did not arise from an imperfect stage of growth; so in 6000 fishes, he had not seen a variety except in coloration, which he had before shown was connected with their growth. So that he would start with the propositions that animals do not vary, and that species remain within the limits of their type.

He exhibited three species of *Toxaster*, a spatangoid echinoderm found in the lower cretaceous deposits, and which occurs in

successive beds of the neocomian. He showed the relation of these to other echinoderms, and the gradations in the various orders. Of the four orders, crinoids, starfishes, echini, and holothurians, the first is synthetic, combining some features of the higher orders, yet on the whole inferior to them; this is the earliest and prophetic type, and is found from the Potsdam sandstone up to the present time, from the cretaceous upward mostly free. Starfishes and echini begin with the Triassic period, and are numerous now; the crinoids of the Permian and carboniferous have affinities with the echinoids and starfishes; from their structure these are perishable, and hard to preserve in a fossil state, — the echini being the best preserved; the slender-armed ophiuroid genera are the oldest. Echini increase as crinoids diminish, arriving at their maximum in the cretaceous, and from that becoming less numerous; only two are found here, on the coast of South Carolina half a dozen, on that of Florida more than twelve, and not more than two dozen would be found in the most favorable localities under the tropics; fifteen species might be considered a fair representative of a fauna, and that number are found in subdivisions of the Jurassic and cretaceous; and these, therefore, may be adduced as evidence of the distinctness of the fauna. The echini as an order present four types or sub-orders: 1st, *Echinus* proper, with the mouth central below and the anus central above, with such types as *Cidaris*, *Diadema*, *Echinus*, *Echinometra*, &c.; 2d, *Echinolampas*, with no teeth; 3d, *Chypeaster*; and 4th, *Spatangus*. No holothurian has as yet been found fossil, and, if not exclusively belonging to the present epoch, they probably did not antedate the Tertiary period. All echini found in the Trias, Lias, Oölite, and Jurassic belong to the 1st sub-order, the 2d and 4th coming in during the cretaceous period; the older forms have the more simple ambulacra; the earliest spatangoids have no connecting groove between the pores, in this respect resembling echinoids, but the later ones present this groove; the specimens exhibited had such echinoid affinities. The relation between these sub-orders and their types is unmistakable, showing something more than derivation, and indicating a system or plan. Thanks to Johannes Müller, the embryology of the four sub-orders of echini is well known; the young *Echini*, &c., are like the adult *Cidaris*; so the young *Echinolampas*,

Clypeaster, and *Spatangus* have the typical form of *Cidaris*. These facts do not look like the effects of sexual derivation, but show a plan, followed in all, and not modified by external circumstances. We have these animals now, and yet the older forms are not extinguished; in every generation we see the growth proceed from *Cidaris* to *Spatangus*, showing that the laborious growth required by Darwin's theory is not logical.

Prof. W. B. Rogers made some remarks supplementary to those of the preceding meeting, on the effects of a subsiding and a rising ocean-floor, as seen in the stratigraphical relations of the resulting land.

If we assume an upward movement of the sea-bottom as the leading condition under which the paleozoic strata were deposited, we must admit a depth of the sea at the commencement of these formations so enormous as to be incompatible with the accumulation of the materials of the earlier strata, unless indeed we suppose these strata to have been formed exclusively in positions within a moderate distance of the shore. But this supposition of a comparatively littoral deposit would not explain the conditions in which the strata are actually known to occur.

We might imagine a series of strata to be successively laid down in a gentle slope, approximately parallel to that of the ancient sea-bottom, each terminating against this surface without being continued into the profounder depths beyond, and we might suppose the floor to be uprising in the region of this accumulation at such a rate as to bring successive tracts, farther and farther from the ancient shore-line, within limits of depth admitting of mechanical and organic deposition. But in such circumstances of formation, these earlier strata, instead of extending, as they are believed to do, almost continuously over the whole ocean-floor, would be seen to terminate at no great distance from the original shore-line, by abutting against the bottom at the places where the depth had set a limit to their accumulation.

Thus, therefore, on no hypothesis of a *secular rising* of the sea-bottom can we explain the formation of our Appalachian paleozoic deposits. On the other hand, considering their aggregate thickness, as well as their continuity, composition, and stratigraphical arrangement, we are entitled to conclude that they were

accumulated during a long period of subsidence of the ocean-floor, varied by many and long pauses and upward oscillations.

Prof. Rogers added a brief notice of the structure of the middle secondary belt of sandstones of the Middle States as a good example of the successive accumulation of shore-deposits previously referred to. He showed that the uniform and gentle slope of all the strata in one direction, and the nature of the materials composing them, concur in indicating the directions from which they have been derived; and he pointed out the manner in which the successive parallel strata in their downward extension terminate against the ancient floor, which in some cases is so shallow as to be partly exposed, with the abutting strata, in the natural sections of the country.

Prof. Agassiz replied that he admitted the shallowness of the ocean in which these strata were deposited; during a local upheaval of the shore, the whole bottom was, in his opinion, subsiding from the shrinking caused by the cooling of the earth's crust. He alluded to the transverse rents across the New York strata in a direction north and south, and mentioned the Schoharie valley, in which the strata increase in thickness from north to south, indicating that the seaside was to the south and the shore-line to the north. He could detect no signs of denudation in these ancient strata of New York. The Potsdam sandstone is both geologically and topographically the lowest.

Prof. Rogers replied that he had listened with extreme surprise to the statement just made by Prof. Agassiz, disclaiming the theory of the rising of the ocean-floor during the formation of our northern paleozoic strata. According to his recollection, the discussion was commenced by Prof. Agassiz's denying the correctness of the views of Darwin and others of the extensive destruction of strata and their fossils during a period of slow upheaval, and urging as an insuperable objection the great extent and completeness of the paleozoic series of New York, which he maintained had been deposited during a *period of upheaval*. As, however, Prof. Agassiz has now stated that he recognizes the *subsidence* of the ocean-bed as essential to the theory of their formation, Prof. Rogers thought it of no importance in this connection how that depression may have been brought about, or

whether it was accompanied by a stationary or a rising condition of the ancient shore.

In answer to an inquiry from Dr. Gould, whether marine deposits are thickest toward the ocean, Prof. Rogers replied that there is no definite rule in this respect, though in the aggregate they are generally thinner in that direction; and he mentioned from measurements in the Appalachian region, that the total thickness there is very greatly less toward the centre.

Prof. Agassiz instanced the *Pholas* borings in the miocene (*mollasse*) of the Jura, in the very edges of the strata, as disproving the statement of Darwin that there is destruction on the edges of strata during upheaval; in this case there was no such destruction during or after upheaval.

Prof. Rogers replied that of course this is not the inevitable result in every case; and in this particular instance it is easy to explain the fact. The occurrence of a stratum containing well-preserved fossils, in direct contiguity with the *pholas*-bearing rocks, is proof of quiet during the formation of the stratum, and therefore of the protection of these rocks from denudation during the deposit.

Mr. Putnam presented from the Museum of Comparative Zoölogy ten specimens of fishes from Lake Neufchatel, and one from the rivers of Switzerland, all very much resembling their American congeners, interesting as showing the great resemblance, yet perfect specific distinctness, of the representative faunæ of Europe and North America.

Dr. Winslow presented an extensive collection of fishes, crustaceans, mollusks, and radiates made by himself at Maui, one of the Sandwich Islands; with others formerly presented by him, these would form a very good representative fauna of this island, and he desired them to be kept in a case by themselves for this purpose.

Prof. Hamilton L. Smith, of Gambier, Ohio, was chosen a Corresponding Member; and Mr. Lincoln F.

Emerson, Dr. J. C. Dalton, and Mr. Charles G. Brewster, of Boston, and Dr. J. R. Webster of Milton, Resident Members.

April 18, 1860.

The President in the Chair.

Dr. Kneeland, on the occasion of the exhibition of two albino children, gave an account of their appearance, and a sketch of albinism in general.

The children are both girls, of the ages of four and seven years, born of parents both black. The parents have had several other children, and one black child between these two. The hair is milk-white, possessing all the characters of negro hair except color; the skin is soft and white; the iris is colorless, and with the pupil has the ordinary pink tint of albinos from the color of the vessels of the choroid; the eyebrows, eyelashes, and down on the body, are pure white. The nose is flattened, the lips protuberant, the heels prominent, as in the black race; and from the external appearance (except in color), the voice, attitudes, and expression, they would pass for common children of black parents. They are active, intelligent, good-natured, and healthy; the parents are also healthy. The eyes are very sensitive to light, and near-sightedness is quite pronounced.

Mr. Du Chaillu gave an account of the habits and the distribution of the Gorilla and other anthropoid apes, from personal observation on the west coast of Africa.

Though a few are found on the left bank of the Gaboon River and about Cape Lopez, the gorillas and the nschego are most numerous in the table-lands of the interior. He never saw more than five gorillas together; the females and young always run off at the sight of man, but the males, if encountered in their retreats, invariably offer battle, approaching the hunter, loudly roaring and beating the breast with their hands, with an ungainly

and difficultly balanced swinging gait. They are shy, though they sometimes come into the woods in the neighborhood of villages in search of berries ; they do not climb trees, except when young, and both sexes repose on the ground, the female reclining against a tree, and the male against some convenient stone ; they never make any shelter for themselves, and never repose twice in the same place. The gorilla sometimes roars by himself for hours at a time. He had never seen them erect their crests when angry and about to attack ; unlike the chimpanzee, the gorilla is perfectly untamable. They are found for three hundred miles eastward from the table-lands, most abundantly where grow the pineapples, nuts, and wild canes, upon which they feed ; their food is entirely vegetable ; they are generally found in moist places. The male gorilla is born black, and remains black through life ; the chimpanzee changes from yellowish coppery to black, but the gorilla is the most shining black ; the female is reddish black ; the back and breast are bare ; it grows gray, and it is said perfectly white, in old age. They have one young one at a birth.

The natives are fond of their flesh ; the brains are held also in high esteem as fetiches to inspire the hunters with courage ; they are called by some tribes "men-of-the-woods," and are by some considered transformed men. He gave several instances of their ferocity and strength ; the stories of their entering villages, driving away the inhabitants, carrying off women, seizing travellers and drawing them into trees by their feet, are all fables.

The nschego is known by its bald head. This species always lives in the trees, in which it makes shelters of branches and vines like an umbrella ; they always select slender trees for their habitations, and such as do not touch other trees with their branches, and place them at least twenty feet from the ground, — probably to secure themselves against the attacks of animals. They are white when young, becoming dark with age.

Dr. B. J. Jeffries exhibited a table, which he had made to assist in determining the question of the degeneracy of the American race at the present time. The table comprised the age, weight, and height of 100 men belonging to a military company of this city, arranged in series of 25, as follows : —

NO.	AGE.	HEIGHT.	WEIGHT.
25	669 yrs.	143 ft. 4½ in.	3782½ lbs.
25	765	144 1½	3979½
25	785	143 3	3794½
25	760	144 10½	3927
100	2979	575 7½	15,483½
Average ..	29.79	5 9	154.83

Oldest person, 56 years; youngest, 18 years; tallest, 6 ft. 4 in.; shortest, 5 ft. 3 in.; heaviest, 205 lbs.; lightest, 110 lbs. Born in Boston, 70; in other parts of Massachusetts, 21; in Maine, 4; in New Hampshire, 2; in New York, New Jersey, and Pennsylvania, 1 each; = 100 men.

Prof. Jeffries Wyman made a communication on two parasites which he had recently had an opportunity of examining.

During the last winter in Florida he found that the alligators almost always had in the last branches of the portal veins a species of *Linguatula*. This belongs to one of the migratory types; in its perfect form it appears lower than in its imperfect condition, — the young having certain crustacean affinities, while the adult is classed among worms; the young have no generative organs, and live in some vegetable-feeding animals, which are swallowed by carnivora, from whose intestines they wander to the liver and other parts of the body.

The other parasite was a Gordiaceous worm found under the dura mater of the *Anhinga* or snake-bird, between the cerebellum and the cerebral hemispheres. He found it in seven out of eight specimens examined, and it probably existed in the eighth; it resembled *Gordius*, with the mouth anterior, the genital opening posterior, and no anal opening. This belongs also to a migratory group. It was found in no other part of the bird.

Dr. C. T. Jackson exhibited a large mass of pearl-covered secretion from a *Unio* from Michigan; the nacre thrown out in this case was uncommonly large, and divided like a bunch of small grapes.

Dr. C. T. Jackson read letters from Dr. Evans and Prof. Henry of Washington, in relation to the great Oregon meteorite; though individuals of the Society had written on the subject, it was feared that from want of a memorial from the Society the appropriation necessary to obtain it would not be inserted in the Congressional bill. On his motion it was voted that a committee be appointed, with full powers, to see what can be done in the matter, and to take any steps which may seem likely to secure the whole or a portion of this valuable specimen for the Museum at Washington.

The President appointed Drs. C. T. Jackson, Bacon, and Shaw, to whom the President was afterward added.

The President read letters of resignation from Dr. D. H. Storer, Dr. S. Durkee, and Dr. Borland, severally resigning the offices of Vice-President, and Curatorships of Microscopy and Herpetology.

The President appointed the following gentlemen a Committee to nominate officers for the ensuing year: Drs. Borland, C. E. Ware, and J. B. S. Jackson.

Messrs. Sprague and Whittemore were appointed a Committee to audit the Treasurer's accounts, and that of the Trustee of the Curtis Fund.

The Treasurer moved to so change the By-Laws of the Society as to make the annual assessment five dollars instead of three, and moved to lay it on the table until the next meeting.

Messrs. Randolph M. Clark of Boston, and Joseph Moore of Cambridge, were chosen Resident Members.

Annual Meeting, May 2, 1860.

The President in the Chair.

The Records of the last annual, and of the last regular meeting, were read and approved.

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

The Treasurer reported a balance on hand of \$159.65.

Besides the large sums paid the former Treasurer and Collector, the expenses of the Cabinet and Journal have been several hundred dollars larger than usual. Nevertheless, thanks to the large surplus at the beginning of the year, the Society is free from debt, and, with the proposed increase of the annual assessment, may even hope to restore the Building Fund, which was necessarily sacrificed to remove its indebtedness. The total number of resident paying members is about 200.

The Librarian reported the addition of 540 volumes and pamphlets during the past year, of which 360 were by donation.

The most valuable consists of the Entomological Library of the late Dr. T. W. Harris, of about 300 volumes, purchased and presented to the Society by J. P. Cushing, Esq., of Watertown, Mass. If the Library increase in the same proportion for another year, there will be no place for the books in the present room. About forty new subscribers have been obtained for the Journal; as this is the principal means of securing the Transactions of other Societies, it is to be hoped that the subscription, which is not burdensome, may be still further increased, until it become general.

The department of Ichthyology has been increased by about 200 species, mostly new, and at least one half of them undescribed.

The principal accessions have been from the Bahamas, by Dr. Bryant; from Maui, Sandwich Islands, by Dr. C. F. Winslow; and authentic original specimens from Prof. Agassiz.

Nearly 300 specimens have been added to the department of Comparative Anatomy.

New cases and shelves have been added, and the collection

arranged in systematic order, heretofore impracticable; the wet preparations have been re-bottled in fresh spirit, and exhibit an interesting series of fetal animals and dissections. An acid and alcoholic solution of strychnia has been found effectual against the ravages of insects, and the chloride of calcium against the dampness and fungous growths in the cases. The specimens have been newly numbered and named, and the nucleus of a helminthological collection has been formed.

The labor of transferring the Harris Collection to the large cabinets, and of making the catalogue, is going steadily on, and will probably be finished in another year.

The department of Crustacea has been increased by 366 specimens, of 78 species and 55 genera, principally from Dr. Bryant from the Bahamas, and Prof. Agassiz and Dr. Winslow from the Sandwich Islands.

The marine algæ procured by Prof. Wm. H. Harvey from Australia, Ceylon, and the Friendly Islands, and presented to the Society by Dr. B. D. Greene, have been securely placed in four quarto volumes, named and numbered as indicated by Prof. Harvey.

All the other departments are in good order, and will be largely increased whenever greater accommodations can be afforded in a new building; the departments of Mineralogy, Oölogy, and Conchology, are specially suffering for want of room.

Mr. Whittemore declined a nomination as Curator of Conchology.

The Nominating Committee made the following report, which was accepted, and the officers for the ensuing year were chosen as follows:—

PRESIDENT,

Jeffries Wyman, M. D.

VICE-PRESIDENTS,

Charles T. Jackson, M. D.

A. A. Gould, 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,	<i>Of Geology.</i>
John Bacon, M. D.,	<i>Mineralogy.</i>
Charles J. Sprague,	<i>Botany.</i>
Thomas M. Brewer, M. D.	<i>Oölogy.</i>
Henry Bryant, M. D.,	<i>Ornithology.</i>
F. W. Putnam,	<i>Ichthyology.</i>
Theodore Lyman,	<i>Radiata.</i>
J. C. White, M. D.,	<i>Comparative Anatomy.</i>
Samuel H. Scudder,	<i>Entomology.</i>
Albert Ordway,	<i>Crustacea.</i>
B. J. Jeffries, M. D.,	<i>Microscopy.</i>
A. T. Lyman,	<i>Conchology.</i>
Samuel A. Green, M. D.,	<i>Herpetology.</i>

CABINET KEEPER,

Charles Stodder.

The Auditing Committee on the accounts of the Treasurer and the Trustee of the Courtis Fund, reported that they were correctly cast and properly vouched.

It was voted, on motion of Mr. Binney, that the annual assessment be raised from three to five dollars.

Mr. Sprague presented, in book form, 160 of the 194 grasses of the northern United States.

The thanks of the Society were voted to Drs. Storer, Borland, and Durkee, and Mr. Whittemore, for their long and valuable services as Vice-President, and Curators of Herpetology, Microscopy, and Conchology, respectively.

The following communication was read:—

ON SOME SUB-PEAT DEPOSITS OF DIATOMACEÆ. BY ARTHUR M. EDWARDS, NEW YORK.

In June, (1859,) I presented to the Society a paper on a semi-fossil deposit of fluviatile Diatomaceæ from near the city of Milwaukee, Wisconsin; I have since learned the following particulars respecting the position of that deposit. A railroad embankment was carried through a bog; the embankment settled, crowding up and inverting the bog,—a common occurrence. For this information, as well as for the specimens, I am indebted to Mr. Stodder, and from him I have received specimens of three other deposits,—one from Bemis Lake, N. H., discovered by Dr. S. A. Bemis, one from Hingham, Mass., discovered by T. T. Bouvé, Esq., and one from Cambridge, Mass., discovered by Mr. Stodder himself. I am also indebted to Mr. E. Samuels and Dr. A. Shurtleff for specimens of a deposit discovered by the last-named gentleman at Brookline, Mass. Mr. Samuels has also sent me mounted specimens of deposits from Derry and Maidstone, Vt., from the Bailey collection in the possession of the Society. To these I have to add a deposit of Diatomaceæ which I have detected at Baisley's Pond, Long Island, N. Y. The consideration of such forms, occurring in the deposits, which I have, as yet, been unable to identify, I will postpone until some future time.

The *Bemis Lake* earth is a true sub-peat deposit, and much resembles those found in different parts of this country; as that discovered by Bailey at West Point, and those from different parts of Massachusetts, discovered by Hitchcock. Of this Bemis

Lake earth Mr. Stodder writes me as follows: "It was found under a few feet of water, uncovered by any earth—the white siliceous deposit showing through the water." This is rather a remarkable fact, showing that the once superimposed peat has either been removed or changed into diatomaceous earth by the decay and removal of its organic matter. It contains so very little beside the siliceous shells of the Diatomaceæ, that it requires but once boiling in nitric acid, and elutriation by means of water, previous to mounting in Canada balsam. The species found in it are the following:

<i>Cocconeia parvum</i> ,	<i>Navicula seriana</i> ,
<i>Cyclotella Kützingeriana</i> ,	<i>Pinnularia major</i> ,
<i>Cymbella cuspidata</i> ,	“ <i>stauroneiformis</i> ,
<i>Eunotia serra</i> ,	“ <i>tabellaria</i> ,
<i>Gomphonema acuminatum</i> ,	“ <i>viridis</i> ,
<i>Himantidium gracile</i> ,	<i>Stauroneis phœnicenteron</i> ,
<i>Navicula affinis</i> ,	<i>Surirella biseriata</i> ,
“ <i>cuspidata</i> ,	“ <i>linearis</i> ,
“ <i>firma</i> ,	<i>Tabellaria fenestrata</i> ,
“ <i>interrupta</i> ,	“ <i>focculosa</i> .
“ <i>rhyncocephala</i> ,	

There is a *Nitzschia* occurring in this deposit, of which, as I have found it in a living state at a different locality, and as I consider it as yet undescribed, I shall at some future time speak more fully.

The *Cambridge* earth, Mr. Stodder informs me, occurs under the following circumstances: "There is a deep bed of clay, over that a few inches (4 to 6) of white sand, in which I could not find a single Diatom; over that one or two inches of reddish earth, probably mostly decomposed vegetable matter, and containing the Diatoms and *Monadina*; over that, vegetable turf and roots. The ground was much broken and disturbed; the above was as near as I could make it out. The locality is but a foot or two above the level of a neighboring pond, and was no doubt a swamp." The species found in it are:

<i>Eunotia serra</i> ,	<i>Pinnularia lata</i> ,
<i>Himantidium bidens</i> ,	“ <i>major</i> ,
“ <i>gracile</i> ,	“ <i>tabellaria</i> ,
<i>Navicula firma</i> ,	“ <i>viridis</i> ,
“ <i>gibberula</i> ,	<i>Stauroneis phœnicenteron</i> ,
<i>Orthosira orichalcea</i> ,	<i>Synedra radians</i> .

Though the number of species in this deposit is not great, it is

remarkable for the curious distortion which many of the individuals appear to have undergone, whether from the influx of salt water, (a likely occurrence, considering the locality,) or from other causes, it is difficult, if not impossible, now to determine. Two species, the largest, seem to have been most affected; these are *Pinnularia major*, which is very much distorted, and *Stauroneis phanicerteron*; *Himantidium gracile* has also, in some cases, been distorted, but not to the extent observable in the two larger species. Under the head of *Eunotia serra* I have in the above list included several forms having elevations (S. V.) varying in number from four to seventeen, as I am of opinion that they all constitute one species.

The *Brookline* deposit, Dr. Shurtleff writes me, occurs under the following circumstances: He says, "I found this under a bed of peat of from six to twenty feet in depth; it was in the form of a stratum of marl, with roots or remnants of roots permeating in every direction. The locality is in Brookline, about one half a mile from the nearest salt-water inlet, but in a meadow lying up on the high ground, many feet above the highest tide-water." The species detected in it are:

<i>Amphora ovalis</i> ,	<i>Nitzschia sigmoidea</i> ,
<i>Cocconeina cistula</i> ,	<i>Orthosira orichalcea</i> ,
" <i>cymbiforme</i> ,	<i>Pinnularia acuta</i> ,
<i>Cyclotella Kützingeriana</i> ,	" <i>lata</i> ,
<i>Cymbella cuspidata</i> ,	" <i>major</i> ,
<i>Epithemia gibba</i> ,	" <i>mesolepta</i> ,
" <i>turgida</i> ,	" <i>nobilis</i> ,
<i>Eunotia diadema</i> ,	" <i>stauroneiformis</i> ,
<i>Gomphonema acuminatum</i> ,	" <i>tabellaria</i> ,
" <i>capitatum</i> ,	" <i>viridis</i> ,
" <i>constrictum</i> ,	<i>Stauroneis anceps</i> ,
" <i>intricatum</i> ,	" <i>gracilis</i> ,
<i>Himantidium pectinale</i> ,	" <i>phanicerteron</i> ,
<i>Navicula elliptica</i> ,	<i>Surirella limosa</i> ,
" <i>firma</i> ,	" <i>nobilis</i> .
" <i>rhomboides</i> ,	

I have put down a form as *Surirella limosa*, (Bailey.) This species is figured by Brightwell (Mic. Jour. 1859) as founded by Bailey; after a careful search, neither Mr. Stodder nor myself can find any allusion to such a species among the papers of Bailey. It however is a distinct species, and may well bear the name given to it. The *Pinnularia mesolepta* in this deposit has invariably, as far as I have seen, a "stauros" or blank space on

the valve similar to that in *P. stauroneiformis*; but I do not consider this enough to constitute a new species.

Of the mode of occurrence of the *Maidstone* and *Derry* deposits I know nothing, and introduce the lists of the species contained in them here for the purpose of comparison, and in the hope that more will be yet known concerning them. That from *Derry* contains the following species :

<i>Cocconema cymbiferum.</i>	<i>Navicula firma,</i>
" <i>parvum,</i>	" <i>obtusata,</i>
<i>Cymbella Ehrenbergii,</i>	" <i>serians,</i>
<i>Epithemia gibba,</i>	<i>Orthosira orichalcea,</i>
<i>Eunotia falx,</i>	<i>Pinnularia nobilis,</i>
" <i>tetraodon,</i>	" <i>viridis,</i>
<i>Gomphonema acuminatum,</i>	<i>Stauroneis gracilis,</i>
" <i>cuspidatum,</i>	<i>Tabellaria fenestrata.</i>
<i>Himantidium gracile,</i>	

Navicula obtusata (misprinted *obtusata* in Smith's Synopsis) has not hitherto been found in this country; neither has *Eunotia falx*; and I believe this is, as yet, the only locality here for either of them.

The *Maidstone* deposit contains the following species :

<i>Cocconema parvum,</i>	<i>Navicula serians,</i>
<i>Cymbella Ehrenbergii,</i>	<i>Pinnularia gibba,</i>
<i>Eunotia tetraodon,</i>	" <i>nobilis,</i>
<i>Gomphonema intricatum,</i>	" <i>viridis,</i>
<i>Navicula cuspidata,</i>	<i>Stauroneis phœnicenteron.</i>
" <i>firma,</i>	

There are also one or two species of *Himantidium* found in this deposit, but, as this branch of botany is at present in a very confused state, and I do not find them described in any reliable work on the subject, I refrain from giving them names. The habit of describing species from deposits is one that cannot be too strongly deprecated, tending as it does to crowd our Botanies with synonyms, not only useless, but really hurtful to the science. No new species can be correctly described from the dead plant alone.

The *Hingham* deposit was found on the estate of Mr. T. T. Bouvé, in an orchard, supposed to have been formerly a pond. It is six or eight inches in thickness, covered with a vegetable mould and earth, apparently washed down from surrounding high ground, of a foot or so in depth. There is, however, no peat present, all of that substance originally present having been changed into this white earth. This deposit was at first taken

for clay; but "infusorial earths" are generally called "marls," even scientific persons not being acquainted with the difference between them and true marls. The species found in it are:

<i>Cocconema lanceolatum,</i>	<i>Navicula firma,</i>
" <i>parvum,</i>	<i>Pinnularia major,</i>
<i>Gomphonema acuminatum,</i>	" <i>nodosa,</i>
" <i>dichotomum,</i>	" <i>viridis,</i>
" <i>intricatum,</i>	<i>Stauroneis Baileyi,</i>
<i>Himantidium arcus,</i>	" <i>phænicerteron.</i>
" <i>gracile,</i>	

That *S. Baileyi* is as distinct a species as many others cannot be doubted, but whether it will eventually be found to be only a variety of *S. acuta* is at present difficult to determine; and though, as I have already said, I am indisposed to admit species into our Botanies which have as yet only been found in a dead condition, I am of opinion that *S. Baileyi* will be proved to be a good species. It has as yet, I believe, been only found in this country.

The *Baisley's Pond* peat was thrown out in large quantities while making excavations for the Brooklyn waterworks, at Baisley's Pond, about $2\frac{1}{2}$ miles south of the town of Jamaica, Long Island. There were, at the time, said to have been two millions of square yards of it thrown out, but I have since ascertained that the quantity would be more correctly represented by two hundred thousand square yards. Portions of the skeleton of a mastodon were found in the peat, but fell into powder soon after being exposed to the air. The species in it are:

<i>Amphora ovalis,</i>	<i>Himantidium bidens,</i>
<i>Cocconeis placentula,</i>	" <i>gracile,</i>
<i>Cocconema lanceolatum,</i>	<i>Pinnularia major,</i>
<i>Cymbella cuspidata,</i>	" <i>mesolepta,</i>
<i>Gomphonema acuminatum,</i>	" <i>viridis,</i>
" <i>cuspidatum,</i>	<i>Stauroneis phænicerteron.</i>
" <i>vibrio,</i>	

I have one or two more deposits, beside the above, yet undescribed, and many more will doubtless be hereafter discovered; in fact, the number that have been found thus far show that Prof. Bailey was right when he said that deposits similar to that he found at West Point would be discovered under every pond and marsh in the country.

Mr. S. H. Scudder made some remarks upon the American white ant, the *Termes frontalis* of Haldeman.

Late in January of this year, a number of the males were sent to the Cambridge Museum by Mr. Allen, of Salem, who asserted that they had done much injury to the grape-vines in his forcing-houses; a week or two after Mr. Scudder visited the greenhouses, and found the dead males collected in large numbers upon the moisture covering the sashes above, and vast numbers of the workers and soldiers swarming under and within every damp piece of wood. Mr. Allen complained that they were not only destroying the ground beams of his house, but that it was impossible for him anywhere to "layer" a vine without the portion beneath the ground being entirely eaten through by the ants, (even several of his large vines, two and three inches in diameter at the ground, had died,) and that the roots upon examination had proved to be mere shells, the interior filled with these ants. Notwithstanding these representations of a careful and interested observer, he was inclined to think, from the well-known habits of *Termites*, that the true cause of the injury was some disease of the vine, and that the *Termites* simply carried away the rotten material. Within a few days, however, he had received the root of a vine, showing similar signs of death with those previously destroyed, which he exhibited to the Society; the whole root was thoroughly chambered by these *Termites*, the excavations being unmistakably carried into the solid living wood; an opening along one side showed the chambers penetrating an inch or more above the level of the ground. Upon a careful comparison of the soldiers and wingless males of this species with those of *Termes bellicosus* of Smeathman, he had ascertained that they were the representatives of distinct though closely allied genera. He believed that this was the first time that any species of *Termes* or an allied genus has been proved to attack living vegetable matter so as to cause its destruction; for, although Smeathman asserts that they do sometimes feed on living plants, Dr. Savage states that trees and shrubs are frequently seen growing through the nests of the *Termites*, yet always alive. A colony of these ants had been kept by Mr. Scudder for some months in a pot with moist earth and rotten wood. On examination it proved that the whole surface, to the depth of two or three inches, was completely riddled with minute passages, about
ough to allow one of these ants to pass another.

Dr. C. T. Jackson announced that a memorial had been sent to Congress by the Committee appointed at the last meeting, in relation to the Oregon meteorite, praying that it might in whole or in part be placed in the Smithsonian Institution, and be thence distributed to scientific bodies.

Messrs. David Loring and Charles W. Morris, of Boston, were chosen Resident Members.

The Annual Meeting was then adjourned to Friday, May 11, at 8 P. M., to hear the Annual Address by Prof. Wm. B. Rogers, in the Hall of the Mechanics' Charitable Association in Bedford Street.

May 11, 1860.

The President in the Chair.

The Society met by adjournment, and listened to a most eloquent and pertinent address from Prof. Wm. B. Rogers, on the progress of Natural Science for the last thirty years, dating from 1830, the year in which the Society was organized. A large, highly intelligent, and enthusiastic audience honored the occasion with their presence, and the Society had great reason to be proud of this successful and brilliant revival of the observance of their Annual Address.

May 16, 1860.

The President in the Chair.

On motion of Dr. C. T. Jackson, a vote of thanks was passed to Prof. Wm. B. Rogers for his very able and

eloquent address on the occasion of the adjourned Annual Meeting of May 11, and a copy was requested for publication.

The Corresponding Secretary read the following letters, viz. :—

From the Society of Natural Sciences of Wurtemberg, the Geographical Society of Paris, the Royal Society of Sciences of Liege, and the Smithsonian Institution, acknowledging the reception of the Society's publications ; from the Wurtemberg Society, the Entomological Society of Stettin, the Royal Society of Liege, the Royal University of Christiania, and the Geological Survey of India, presenting their publications.

A letter from Mr. Chas. F. Hartt, of Wolfville, N. S., in relation to minerals and fossils of the British provinces, was referred to the Curators of Geology and Mineralogy.

Dr. John Bacon presented the following report on the "cocoa-nut pearl" referred to him for examination.

A singular gem from Singapore, called a "cocoa-nut pearl," was exhibited by Dr. C. F. Winslow at the meeting on February 1st, and was referred to me for microscopical and chemical analysis. The partial examination which I have been able to make shows that the body is an interesting one. Its origin was not known to the owner by personal observation, but it was said to be a concretion of very rare occurrence, formed in the interior of the cocoa-nut. Through the politeness of the owner, Frederic T. Bush, Esq., I was requested to use one half or more of the pearl for analysis. As a section passing through the centre was desirable, I had it so divided by a lapidary, and employed one half for making several sections in different directions for examination under the microscope and for chemical analysis. The remaining half, now exhibited, has been reset in the ring, and presents the same appearance as formerly.

The peculiar characters of this gem are most readily described by comparison with those of animal pearls, which it resembles in

many respects. It is about one quarter of an inch in diameter, and of a spherical shape. Its surface, evidently a natural one, is smooth, and of a milk-white color, with little lustre. On close examination, the surface appears mottled, and faint undulated markings are seen within. In hardness it much exceeds true pearls, equalling feldspar, or the average hardness of opal. The hardness of pearls varies to some extent. Several specimens of different species which I had an opportunity to test ranged between calcite and fluor-spar; none were so hard as fluor.

Chemical composition. The cocoa-nut pearl consists of carbonate of lime, with a very small proportion of organic matter; so little that it does not blacken nor evolve any odor before the blowpipe. When the carbonate of lime is removed by the slow action of very dilute acids, a transparent substance remains, of great tenuity, showing no structure under the microscope, and incapable of preserving its form. Notwithstanding the filmy character of the organic residue, a few micro-chemical reactions were satisfactorily obtained. It is insoluble in water, alcohol, and ether. With strong nitric acid it takes a yellow color, and on adding ammonia becomes intensely yellow. Iodine colors it brownish yellow, and the addition of concentrated sulphuric acid does not change the color to blue, the tint given by iodine being retained a week or more. These reactions are sufficient to indicate that the organic substance is an albuminous body, and not cellulose, the basis of vegetable tissues in general. Since albuminous substances occur in plants as well as in the animal kingdom, we cannot from these reactions infer the animal origin of the gem in question. True pearls consist of carbonate of lime, with a considerable amount of albuminous animal matter. When decalcified by dilute acids, the organic residue retains the form and structure of the pearl; and in the nacreous pearls, the characteristic iridescence also.

Microscopical characters. Thin sections examined under the microscope show that the cocoa-nut pearl is composed of numerous regularly concentric laminæ, adhering pretty firmly together. These layers form groups differing slightly in tint, and near the exterior are often exceedingly thin. The centre is occupied by a semitransparent mass resembling the surrounding layers. No foreign nucleus was found. The general mass is made up of radi-

ating bands of crystalline fibres, inclined at different angles in contiguous bands. In the outer layers, the crystalline structure becomes strongly marked with rhombohedral cleavage. Probably the great hardness of this pearl depends upon the peculiar crystalline arrangement, with a little organic matter binding the whole firmly together.

Pearls exhibit two principal varieties of microscopic structure. The true or nacreous pearl is formed of concentric laminae of nacre, and shows a finely furrowed surface, and no radiating lines within. The markings of the nacreous membrane, by which iridescence is produced, are faintly visible in the sections as very fine undulated and dotted lines. In the second variety of pearl, a prismatic cellular structure occurs. These pearls exhibit well-marked radiating lines, as well as concentric layers. In many specimens of pearl, both varieties of structure are found. The cocoa-nut pearl presents a general resemblance in microscopic characters to the second variety, but differs essentially in the details of structure, as is evident from the sections now exhibited of pearls from pearl oysters and from freshwater clams, — showing the nacreous and prismatic varieties, and combinations of both.

I cannot find that any species of pearl or other concretion resembling this has been described. Nor could I learn from our best botanical authorities that any concretion is known to occur in the cocoa-nut. The milk of this nut contains, according to the reported analyses, a little phosphate and malate of lime, but no carbonate; nor is the carbonate found in any part of the nut. Possibly an analysis of the immature nut might give a different result. The only concretions of vegetable origin which approach this in composition and structure are the cystolithes found in the leaves of *Urticaceæ*, and some other families of plants. These are minute bodies, showing concentric lamination. But they consist of a matrix of successive layers of cellulose, upon which crystalline masses of carbonate of lime are deposited in a kind of efflorescence; a wholly different mode of formation.

In the animal kingdom, several kinds of concretions besides pearls bear more or less resemblance to this body in composition and structure; especially the concretions of carbonate of lime formed in the bladders of herbivorous animals, in which more or less animal matter is always combined with the salt of lime.

Numerous concentric layers and a radiated crystalline structure are frequently visible. The organic matter is usually in small proportion, though often sufficient to preserve the original form and structure when the carbonate of lime is removed by acids; occasionally there is more animal matter than in true pearls.

It is to be regretted that the origin of the cocoa-nut pearl is not certainly known, since neither the chemical nor microscopic characters are sufficient to point out its source and mode of formation. Were the statement of its origin perfectly reliable, it might be regarded as the product of a diseased condition of the nut. The concentric lamination might seem to require a longer time than the rapid growth of the cocoa-nut would admit of, but in the case of animal calculi of similar chemical composition, and of such as can be made artificially, these layers, whether resulting from successive depositions or from a process of segregation, may be rapidly formed. A few weeks, and sometimes only a few hours, are sufficient for the production of numerous laminæ.

Prof. Rogers presented, in the name of Mr. Urbino, a work by H. Wagner on cryptogamic botany with herbarium, and a work on *Juncaceæ*, *Gramineæ*, &c.; he also presented from R. B. Forbes, Esq., the half of a large geode from Uruguay, consisting of chalcedonic quartz, very flint-like on the outside; the thanks of the Society were voted for these donations.

The President observed, in reference to the last specimen, that such geodes, and agates, are very abundant in that region, but that they are not in place, having been transported by the river from the north. This was obtained at Salto.

Mr. A. T. Lyman having resigned the curatorship of Conchology, Dr. Gould, Mr. Whittmore, and Dr. White were chosen a Committee to nominate a candidate for the office.

The President gave an account of some dissections which he had recently made of the poison apparatus of the rattlesnake.

He had not found the connection of the duct and the poison gland to correspond with the descriptions usually given. The duct proper does not reach the opening at the base of the tooth, but ends at a short distance from it. The communication beyond this is made by means of the sheath of the tooth, which is too loose to prevent the poison from escaping around the exterior of the tooth instead of entering its canal, were it not for the circumstance that, as the tooth is protruded, the sheath is crowded back, and thus made to fit tightly the circumference.

He had seen a rattlesnake, when held in such a manner as to prevent its striking, discharge the poison in a simple jet to the distance of several inches. He also mentioned the habit which the rattlesnake is known to have of living in company with other animals. While recently in Florida, he had found two large rattlesnakes and an opossum living in the same nest with the wood rat.

Prof. Rogers presented a specimen of shale with adhering coal from the Albert Mine, New Brunswick, obtained from the depth of 460 feet, as illustrating the geological position of the material.

The coal is seen to be attached to the edges of the layers of rock, and not parallel to them. Throughout the greater part of the mine the direction of the bedding of the slates makes a considerable angle, and is sometimes nearly perpendicular to the course of the coal. This and the jagged form, and other irregularities of the walls, satisfied him that this deposit is not a true bed or seam, but is material which has been accumulated in a *fissure or fracture* of a date subsequent to the formation of the bituminous shales and other carboniferous rocks of the region. The neighboring strata are heavily charged with bituminous or asphaltic matter, and may easily be conceived to have furnished, by some process of distillation or mechanical conveyance through the influence of gentle heat, the pure combustible material which fills this and other local fissures of the neighborhood.

In the very substance of the coal are sometimes found imbedded fragments of rock like the sides of the vein, evidently having fallen down during its deposition.

He also presented a specimen showing in what manner the laminae of the slates have been warped and twisted by mechanical causes, indicating great disturbance. When a coal has been powerfully dislocated after deposition, it presents a structure like the contorted and disturbed slates which surround it. No such structure is to be detected in the Albert deposit.

Dr. Jackson observed that these rocks are everywhere bituminated for miles, and that these veins of coal, in his opinion, are of the same age as the rocks that contain them. The coal is very much changed, 85 per cent. being true coal, and 15 per cent. only bitumen. Bituminous springs are common, bituminous films being deposited on the soil; he agreed with Prof. Rogers that it was not a regular deposit, but rather an exudation than a distilled product.

Prof. Rogers remarked that the oil wells of northern Pennsylvania are generally in deposits of the same age as the Albert coal, *i. e.*, they come up through the rocks below the coal measures, which are older than the carboniferous limestones, and which are there the surface rocks of the country.

Dr. Jackson, from finding fossil plants and fishes, regarded these deposits as belonging to the lower coal series; if originally bituminous, the coal has undergone great changes, for we find every grade from the coal oil to the Albert coal (softening at the temperature of melting zinc), and even to anthracite; he considered the Albert coal one stage higher than cannel in the scale of bituminization.

Prof. Rogers maintained that the carboniferous limestone intervenes between the geological horizon of the Albert coal and the true coal measures; and that this coal, though belonging to the lowest carboniferous series, is far below the proper coal measures or the group of the great productive coal rocks of the Appalachians and Nova Scotia.

The following Standing Committees were appointed by the Council for 1860-61:—

On the LIBRARY. Messrs. C. K. Dillaway, C. J. Sprague, and J. Bacon.

ON PUBLICATIONS. Messrs. C. K. Dillaway, S. L. Abbot, J. Wyman, S. Kneeland, Jr., and A. A. Gould.

ON FINANCE. Messrs. T. T. Bouvé, J. M. Barnard, and A. Binney.

June 6, 1860.

The President in the Chair.

Mr. P. B. Du Chaillu presented descriptions of five new species of mammals discovered by him in western equatorial Africa, as follows:—

I. TROGLODYTES CALVUS, (Du Chaillu,) sp. nov.

Description of an adult female. Head entirely bald to the level of the middle of the ears behind; scalp black, smooth, and shining; eyebrows thin, bristly, long and black; face black; eyes somewhat sunken; nose flat; sides of the face hairy from the ears, the hair very short; short, scanty beard under the chin, mixed with a few gray hairs; ears large, somewhat smaller than in the chimpanzee, standing out laterally from the head.

General color: the body in front with thin, blackish hair; neck, arms, and upper two thirds of the back with long, thick, black hair; lower third of the back light brownish gray; legs of the same color as the lower third, mixed with black in front; hands and feet black, and hairy on the back to the beginning of the fingers and toes. External genital organs prominent as in the dog, bare, wrinkled, and flesh-colored. Height in erect position, 43 in. Width across the shoulders, 18 in. Circumference of the chest under the arms, 36 in. Length of the arms, (reaching to the knees,) to the end of the fingers, 29 in. Length of the forearm, 11 in. Length of the hand, 8 in.

The female, of which the above is a description, was killed with a young one having a very white, pale face, and which, though not possessing any distinctive baldness, had the hair on the head exceedingly thin. In other young specimens the baldness could be seen, though not extending so far back as in the

adult specimen. As the animal grows older, the hair becomes gray. A male was killed four feet four inches in height, gray, and having the lower third of the back almost bare of hair.

The external characters of this animal are so different from those of *T. niger*, (chimpanzee,) and from those of the gorilla, that it may be considered a new species of the genus *Troglodytes*, for which I propose the name of *T. calvus*.

The most striking external character which distinguishes the *T. calvus* from the *T. niger* (to which alone it can be compared) is the entire baldness of the head, which was seen in the four specimens killed, both male and female; the very young are not bald, but the hair on the head is very thin.

The *T. niger* has also a very black face, but the young is of a darker flesh-color than the young *T. calvus*. The *T. niger* is rare in the countries which I have explored, with the exception of the Gaboon, Moonda, and Muni rivers, where it is more abundant than south of the equator, where I have been; I killed but one, near Cape Lopez; I saw another which had been killed by the natives in the Camma country, which presented the same external characters as the one I killed at Cape Lopez.

The natives of the Camma country call the *T. niger* "*Nschiego*," and the *T. calvus* "*Nschiego Mbouvé*," the latter meaning something like another tribe of the Nschiego. The Mpongwé called the *T. niger* Nschiego, or the N'chego of Dr. Franquet. The *T. calvus* builds a shelter made with the branches of trees, elevated generally from twenty to thirty feet; they tie together with wild vines the branches they have collected, and there is below the shelter (which has the shape of an umbrella) a horizontal branch on which they rest; this horizontal branch is always the first from the ground. The male lives under one shelter, and the female under another, on a neighboring tree.

I am aware that Dr. Franquet, of the French navy, who resided at the Gaboon River, mentioned in a letter, dated Brest, December 1, 1852, addressed to M. Is. Geoffroy St. Hilaire, (and published in the *Archives du Muséum d'Histoire Naturelle*, tome X., livraisons 1 and 2,) that there are three species of anthropoid apes in Western Africa. The following are extracts from this letter: (p. 93,) "At Gaboon I saw a number of chimpanzees, all coming from the peninsula between the rivers

Moonda on the north and Gaboon on the south; not one *T. niger* came (as far as I could ascertain) from the left bank of the Gaboon, *i. e.* from the locality whence are obtained the gorillas and the nschiego." * * * P. 94, "The Mpongwés, or the natives of Gaboon, call the gorilla N'gena (and not Enge-ena), while they give the name of N'tcheho (and not Enge-eko) to an ape smaller than that whose adult skeleton I sent to the Museum; I do not know what name they give to the chimpanzee; supposing (which is little probable) that they call also the chimpanzee N'tcheho, would this show that they confound under this name two species? I think not. I believe there are on the coast of Africa three distinct species of anthropoid apes: 1. the chimpanzee (*T. niger*, G. St. Hilaire), with a naked, flesh-colored face, ears large and red, the hair black and thin, &c. &c.," — 2. the gorilla, which he describes, — "and 3. the N'tcheho," which he goes on to describe as follows: "It has a black face and small ears like the gorilla, and the hair is shorter and darker colored; it never attains the size of the gorilla, and never has the reddish streak which has been mentioned; the antero-superior crest of the adult cranium is barely, if at all, visible. The muzzle is less prominent than in the gorilla, giving to the face a more human expression than in any other ape. I do not remember all the minor differences of anatomical detail, but only the striking characters which could not escape the least attentive observer. The N'tcheho is no more the gorilla, than is the latter the chimpanzee; on this I insist, as I believe I am the first to advance the opinion that there are three anthropoid apes on the African coast."

After a careful examination of this letter, I am forced to the conclusion that the N'tcheho of Dr. Franquet is nothing but the adult chimpanzee (*T. niger*). The chimpanzee is found north and south of the equator, and consequently north and south of Gaboon, and near Loango becomes very abundant; it may be said to occupy almost the whole range of the western coast of Africa, between the tropics.

Dr. Franquet speaks of the chimpanzee (*T. niger* of Geoffroy St. Hilaire) as having the face flesh-colored. This color belongs incontestably to the young chimpanzee, for the old ones, and even those that are not quite full grown, have a black face; this,

I think, accounts for the error made by Dr. Franquet, that he had seen a different species. I have killed an old chimpanzee at Cape Lopez (of which I have the specimen) whose face was entirely black, and whose head was covered with hair; and I saw another one that had been killed by the natives in the Camma country presenting exactly the same appearance as the first; consequently I am led to the conclusion that the third species of Dr. Franquet is not the *T. calvus*, for he would not have forgotten to mention, and certainly would have observed, the entire baldness of the head, which is the most striking feature of the animal. The *T. calvus* also has large ears, like those of the *T. niger*. The *T. calvus* I have thus far found in the interior, south of Cape Lopez, but I suppose it has a wider geographical range.

2. TRAGELAPHUS ALBO-VIRGATUS, (Du Chaillu,) sp. nov.

This large bovine antelope is found in the Ashankolo Mountains, 60 miles south of the equator and 140 miles from the coast; it probably belongs to the genus *Tragelaphus*; it is called "Bongo" by the natives.

Description of a male, the smallest seen in a herd of eight. General color bright orange rufous; chestnut patch between horns and eyes, extending two inches below the eyes, with rounded edge in front. Below this a white crescent an inch wide, divided in the middle by a dark brown stripe which extends in the median line to the muffle. Sides of the face below, light wood-brown, shading into yellowish rufous on the cheeks to just beyond the eyes. On the cheeks, below the eyes, a white patch divided into two lobes, of which the upper is about $2\frac{1}{2}$ inches long, and the lower $1\frac{1}{4}$ inches. Muffle black and bare, with a few long bristles on each side of the nostrils; the upper lip white and hairy, except a narrow space on the median line; tear-bag not distinct, but in its place a bare space, — in this respect diverging from the typical species of *Tragelaphus*, and coming near the genus *Oreas*. Under lip white; throat with longer, shining black hair, for about a foot in length and $3\frac{1}{2}$ inches in width in the middle, diminishing in a rounded point above and below; the white spots on the cheeks extending to the edge of this gular spot. Ears ox-like, rufous, and lined on the inside.

with long white hair. Neck, above and below, bright rufous, with a white crescent at the lower part, sixteen inches in its transverse extent, two inches wide in the middle, and diminishing to a point at each end. A median line on the neck above with dark rufous hair, slightly elongated, and whorled at the lower part, the hair very slightly longer and pointing upward. Below the whorl for four inches and to first dorsal stripe, thin, long, dark rufous hair mixed with a few black ones, two inches long, not erect. Back with a very narrow white median line from between the first dorsal stripes, or the middle of the shoulders, to within three inches of the tail, mixed with a few dark hairs at its upper portion. From the median line extend, on the right, fourteen white stripes, and on the left fifteen, extending on both sides to within three inches of the median line of the abdomen; stripes about half an inch in width, the first one over the fore legs, and that of one side meeting the other; below this seven stripes on the left and six on the right, irregular, not opposite each other; below these again opposite each other to the last; the last stripe but one running down to the upper part of the hind-legs, and the last extending down the back of the nates. Tail rounded, sixteen inches long, thinly covered with rufous hair of the general color of the body, ending in a tuft of longer hair of somewhat darker rufous. From between the fore-legs to lower third of the abdomen on the median line, a patch of soft hair of purplish brown color, four inches in its greatest width on either side; on the lower third of the abdomen, and between the hind-legs, the skin is bare of hair, and of milk-white color, extending between the legs, growing narrower to the anus.

Fore-legs: upper part in front bright rufous, ending in a ring behind. The front of the fore-leg below, blackish, mixed with rufous extending to false hoofs, then interrupted by a white spot an inch wide, and then again narrowly encircling the hoofs. The posterior part of the fore-leg white, with the exception of the rufous ring on the forearm and another on the middle of the metatarsus, the latter of a darker color extending on the median line quite to the true hoofs. Hind legs rufous behind and blackish between the false and true hoofs, anterior surface white, with a rufous ring just above the knee, and another ring mixed with black at the point of the false hoofs; just above the true

hoof a narrow ring of dark encircling the limb at this point. False hoofs small, and, with the true hoofs, black ; width of the hoof two and a half inches.

Horns sublyrate, ringed at the lower portion, and spirally twisted, keeled below, and ridged externally. Space between the horns at their origin two inches ; at the tip six inches ; greatest width, measured from the outside, twelve and three fourths inches ; length of the horn in a straight line sixteen inches ; along the curve outside nineteen inches. Horns black, upper three inches yellow horn-color, smooth, polished, and very pointed.

The animal equals in size the largest antelopes, and is certainly the handsomest yet discovered ; it is graceful, though somewhat heavy, and is exceedingly shy ; it is also considered by the natives very rare. It is found about the head waters of the Fernand-Vaz, in the immense forests of the interior ; it does not occur on the maritime plains or flat country between the table-land and the sea. In coloration it somewhat resembles the *T. euryceros*, Gray.

3. POTAMOCHÆRUS ALBIFRONS, (Du Chaillu,) sp. nov.

Description of an adult male. Ground color bright red bay. Head white ; a triangular black space, the base between the ears and ending in a point on the median line, about three inches below the eyes. Face elongated, with a black, warty protuberance on each side half-way between the nose and eyes, and in front a circular black line extending nearly to the angle of the mouth ; nose black ; round the eyes long black bristles ; eyes surrounded by a white line three fourths of an inch wide, of the general color of the head interrupted by bay opposite the ears ; from the ears a black stripe mixed with rufous hair coming down the cheeks ; whiskers long, white at the base and reddish at the end, forming a whitish stripe behind the black stripe of the cheeks ; ears elongated, suddenly tapering and ending in a long pencil of hair of whitish color mixed with black ; borders of the ears black. Median line a narrow white stripe, ending at the root of the tail, the lower hair long and mixed with black. Under the jaw whitish, with a few scattered black hairs ; at the angle of the mouth a black band encircling the jaws. Fore-legs in front black mixed with rufous ; behind of the general color of the

body. Hind-legs: black ring round the heels; metatarsus black in front. False hoofs large and long. Tail straight and long, of the general color of the body, and ending in a tuft of black hair. From the tip of the nose to between the eyes, 10 in. From nose to between the ears, 15 in. From point of the nose to root of the tail, 50 in. From the root to the end of the tail, 19 in. Length of the tuft, 4 in. Length of the ears measured in front, $7\frac{1}{2}$ in. Ears with the pencil, $12\frac{1}{2}$ in.

This species is different from the *P. penicillatus*, (see Proceedings of the Zoölogical Society of London, 1852, page 129). The most striking difference is in the color of the head; this in the latter being black, but white in this species; in the latter the tail is black, while in this it is red and tufted with black hair at the end.

The *P. albifrons* is found in all the countries I have explored, in the interior and in the high table-lands, and is very abundant between Cape Lopez and Cape St. Catherine, and on the head waters of the Fernand-Vaz River.

4. GENETTA FIELDIANA, (Du Chaillu,) sp. nov.

Description of an adult male. Ground yellowish gray; body covered with brownish black spots. Top of the head rufous, mixed with gray, running to a sharp point a little below the eyes; whiskers long and white, some of them brown at the base, and some of the shorter ones entirely brown; ears cinereous with dark hair at the base; cheeks cinereous mixed with rufous; four dark spots, somewhat in a circle, an inch beyond the angle of the mouth, just under the ears; circle round the eyes dark brown, under it a white spot running toward the nose; sides and front of the nose white; chin and throat cinereous. On the neck above, behind the ears, two longitudinal bands, brownish black mixed with a little rufous, running backward and outward over the shoulders behind the fore limbs; between these an indistinct median band of the same color, soon becoming double and diverging, and between the shoulders dividing into five longitudinal bands, of which the median is continuous to the base of the tail, increasing gradually in width; the two laterals on each side broken up into five or six smaller longitudinal spots; on the flanks a row of seven or eight spots of the same blackish brown

color. All the lower parts from the throat cinereous white, tinged with yellow on the abdomen; on the upper part of the breast a few indistinct pale purplish spots. Fore-legs cinereous, tinged lightly with brownish yellow, with a few purplish brown spots on the outside extending to the feet. Hind-legs: thighs marked like the back, but with spots more rounded and smaller; inside of the hind-legs unspotted, with a light brown tinge; about genito-urinary organs whitish. Tail well developed; with seven dark brownish black rings, the first incomplete below and the last indistinct; the last five inches dark brownish black; above and below six gray rings, lighter underneath; the last ring not well marked. Length, $21\frac{1}{2}$ in. Length of tail, 20 in. From the muzzle to the middle of the ears, $3\frac{1}{2}$ in. From the muzzle to the eyes, $1\frac{1}{4}$ in.

This species differs from the *G. Poënsis* (Waterhouse.) The latter has dark brown legs; the fore limbs of this new species are also spotted in front, and the tail is almost of the same length as the body. It differs also from the *G. servalina*, (Pucheran,) which has no median stripe, and is also of a more brownish color, the legs being also blackish.

I propose for this species the name of *Genetta Fieldiana*, in honor of our distinguished fellow-citizen, Cyrus W. Field, as a token of friendship. This beautiful and rare species inhabits the country of the interior south of the equator.

5. ANOMALURUS BELDENI, (Du Chaillu,) sp. nov.

General color above, including the flying membranes, a mixed black and yellowish cinereous, arising from each hair being black at the base and tipped with yellowish or rufous white. On the back the hair is tipped with bright rufous, which gives a rufous tinge from behind the ears to the lower third of the body on the median portion to the commencement of the membranes. Whole head above hoary, mixed with light brown; sides of the head, to behind the ears, brownish black, darkest behind the ears and lightest about the nose. Under throat lighter brownish black mixed with light cinereous, gradually shading into the dirty yellowish white of the upper parts; a light yellowish cinereous spot under the ears. Abdomen dirty yellowish white; under surface of membranes scantily covered with light yellowish brown

hair. Outside of limbs blackish brown, more or less mixed with hoary; inside of limbs below the membranes lighter. Upper part of tail above and sides like the lower back, but mixed with more yellowish white; rest of tail black, the hair gradually increasing to a tuft at the end; shape of the tail rounded. Teeth large and narrow, deep orange yellow; whiskers black, and about four inches long; ears long, rather pointed and bare, surrounded at the base with long brownish black hair; claws curved and sharp, four on the fore and five on the hind feet, covered above, especially on the hind feet, with long jet-black stiff hair. Extending from the root of the tail below, for about three inches and a half, sixteen scales of a pale horn-color, arranged in two longitudinal series alternating with each other, and decreasing in size downward; the scales sharp-pointed and prominent. Length from tip of the nose to root of tail, 15 in. Length of the tail, 11 in. Length from the tip of the nose to base of the ears, $2\frac{1}{2}$ in. Length from the tip of nose to the eyes, $1\frac{1}{2}$ in. Length of the horny part under the tail, $3\frac{1}{2}$ in.

This animal is nocturnal, and inhabits the forests, and is consequently exceedingly difficult to get; during the day they stay on the branches of dead trees, surrounded by a great number of dead vines. This is the only specimen I met with.

I propose for this new species the name of *Anomalurus Beldeni*, in honor of George Mortimer Belden, Esq., as a token of friendship from one who remembered him often while in the wilds of equatorial Africa.

The chief peculiarity of this species is the two distinct colors of the tail which ends in a tuft.

This makes four species of *Anomalurus*, which are these:

A. Fraseri (Waterhouse).

A. Pelti (Temminck).

A. Beecrofti (Fraser).

A. Beldeni (Du Chaillu.)

Dr. C. T. Jackson presented the following analysis of the juice of the leaf-stalks of the garden Rhubarb (*Rheum rhabonticum*).

The leaf-stalks, by pressure, yield 90 per cent. of clear juice, and 10 per cent. of cellulose and fibrous matter. 1000 grains of the filtered juice, on evaporation, yield 31 grains of solid extract; this, burned, leaves 3.3 grains of ashes, or the saline matters of the plant converted mostly into carbonates of the alkali and lime.

The ashes, analyzed, yielded

Potash	1.717
Phosphate of lime	0.350
Lime	0.002
Carbonic acid	1.200
	<hr/>
	3.269

1000 grains of the filtered juice, analyzed for the acids, saccharine matter, and mucilage, gave

Oxalic acid	3.53
Malic acid	7.30
Glucose or grape sugar	9.63
Mucilage	3.30
	<hr/>
	23.76

The oxalic acid is combined with potash as the binoxalate of potassa, but there is a slight excess of acid over the quantity required for the base. The malic acid, with the exception of the small proportion required for saturation of 1000 grains of lime, is in a free state.

It has long been known that the juice of the rhubarb stalks is the best source from which we can obtain malic acid. This juice has been employed to make an imitation of Champagne wine, but the absence of cream of tartar renders it unfit for that purpose, and the so-called wine is more like cider, the malic being the characteristic acid present.

Dr. T. M. Brewer presented the following list of the
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birds of Cuba, compiled from two lists furnished by Dr. John Gundlach, of Havana.

One of these, bearing date of October, 1855, contained a list of all that had been observed up to that time, whether visitants or residents; the other, written in February, 1860, gives only the birds known to breed in the island. These would probably have been more complete, if the list of 1860 had not been restricted to resident birds, but had also referred to migratory visitants. In a few instances, where the species has been ascertained to be different from Dr. Gundlach's supposition, he has taken the liberty to change the nomenclature. The list comprises 251 birds.

* Birds, the eggs of which have been obtained.

† Birds, the nest or young of which have been obtained.

‡ Birds resident on the island throughout the year, but whose breeding on the island is inferred.

- | | |
|--|---|
| * <i>Cathartes aura</i> , Illig. | ‡ <i>Otus signatus</i> , Orb. |
| <i>Falco anatum</i> , Bon. | <i>Brachyotus Cassinii</i> , Brewer. |
| <i>Hypotiorchis columbarius</i> , L. | * <i>Ephialtes nudipes</i> , Daud. |
| { * <i>Tinnunculus sparverius</i> , L. | * <i>Glaucopteryx Sibilans</i> , Orb. |
| { * ? " <i>sparveroides</i> , Vig. | * <i>Chordeiles Gundlachi</i> , Lawrence. |
| { * ? " <i>Dominicensis</i> , Bris. | * <i>Antrostomus vociferus</i> ? Wils. |
| { <i>Accipiter fuscus</i> , Gmel. | * <i>Tachornis gradii</i> , Lemb. |
| { † ? " <i>fringilloides</i> , Vig. | <i>Hirundo rufa</i> , Gmel. |
| † " <i>Cooperii</i> , Bon. | * <i>Petrochelidon fulva</i> , Vieill. |
| { " <i>pileatus</i> , Pr. Maz. | " <i>bicolor</i> , Vieill. |
| { " <i>Mexicanus</i> , Sw. | * <i>Progne purpurea</i> , Boie. |
| † <i>Buteo borealis</i> , Gmel. | <i>Cotyle riparia</i> , L. |
| † " <i>Pennsylvanicus</i> , Wils. | † <i>Cypselus collaris</i> , Pr. Maz. |
| <i>Nauclerus furcatus</i> , L. | † " <i>niger</i> , Gmel. |
| † <i>Rostrhamus sociabilis</i> , Vieill. | <i>Ceryle alcyon</i> , L. |
| ‡ " <i>hamatus</i> , Illig. | <i>Mellisaga colubris</i> , L. |
| <i>Cymindis uncinatus</i> , Illig. | * <i>Ardeorhina cyanea</i> , L. |
| <i>Circus Hudsonicus</i> , L. | * <i>Chlorestes Ricordii</i> , Gmel. |
| † <i>Regerhinus Wilsonii</i> , Cass. | ‡ <i>Orthorhynchus Helens</i> , Gundl. |
| ‡ <i>Pandion Carolinensis</i> , Bon. | * <i>Culicivora caerulea</i> , Bon. |
| { * <i>Polyborus cheriway</i> , Jacq. | * " <i>Lembeyii</i> , Gundl. |
| { * " <i>vulgaris</i> , Wils. | * <i>Enicocichla aurocapillus</i> , Lath. |
| { * " <i>tharus</i> , Molina. | " <i>major</i> , Cab. |
| { * " <i>Brasiliensis</i> , L. | ‡ " <i>Novelboracensis</i> , Gundl. |
| * <i>Hypomorphus Gundlachi</i> , Cab. | <i>Mniotilta varia</i> , L. |
| * <i>Strix furcata</i> , Temm. | <i>Sylvicola coronata</i> , Lath. |

- Sylvicola striata*, *Lath.*
 " *pensilis*, *Lath.*
 " *virens*, *Lath.*
 " *maritima*, *Wils.*
 * " *æstiva*, *Gmel.*
 " *petechia*, *Lath.*
 " *Americana*, *Lath.*
 " *Canadensis*, *L.*
 " *maculosa*, *Lath.*
 " *discolor*, *Vieill.*
 † " *pityophila*, *Gundl.*
Helenaia vermivora, *Lath.*
 " *chrysoptera*, *L.*
 " *Buchmani*, *Aud.*
 " *peregrina*, *Wils.*
Trichas Marilandica, *Bris.*
 * *Galeoscoptes rubripes*, *Temm.*
Turdus mustelinus, *Gmel.*
 " *Wilsoni*, *Bon.*
 " *Swainsoni*, *Cab.*
 * *Mimus polyglottus*, *L.*
 † " *Gundlachi*, *Cab.*
 " *Carolinensis*, *Licht.*
 † *Myiadestes Elizabeth*, *Lemb.*
 † *Melittaruchus magnirostris*, *Cab.*
 * " *Dominicensis*, *Bris.*
 * *Tyrannus caudifasciatus*, *Orb.*
 " *intrepidus*, *Vieill.*
 " *crinitus*, *L.*
 * *Myiarchus stolidus*, *Gosse.*
 " *Lembeyii*, *Gundl.*
 " *virens*, *Gmel.*
 " *pusilla*, *Sw.*
 * *Blacicus Caribæus*, *Orb.*
Setophaga ruticilla, *L.*
 " *mitrata*, *L.*
 " *formosa*, *Wils.*
Vireo flavifrons, *Vieill.*
 " *solitarius*, *Vieill.*
 " *Noveboracensis*, *Gmel.*
 * " *Gundlachi*, *Lemb.*
 " *olivaceus*, *L.*
 * *Phyllomanes barbatulus*, *Cab.*
 * " *altiloquus*, *Vieill.*
 * *Teretistris Fernandinae*, *Lemb.*
 * " *Fornsi*, *Gundl.*
Bombycilla Carolinensis, *Bris.*
 † *Todus Portoricensis*, *Less.*
 * " *multicolor*, *Gould.*
 * *Corvus nasicus*, *Temm.*
 † " *minutus*, *Gundl.*
 * *Sturnella hippocrepis*, *Wagl.*
 * *Calcophanes baritus*, *L.*
 * *Scolecophagus atroviolaceus*, *Orb.*
 * *Xanthornus Dominicensis*, *L.*
Yphantès Baltimore, *L.*
 " *Bullockii*, *Sw.*
 * *Agelaius assimilis*, *Gundl.*
 * " *humeralis*, *Vig.*
Dolichonyx orniator, *L.*
Guiraca Ludoviciana, *L.*
 " *cærulea*, *L.*
Pyrranga æstiva, *Gmel.*
 " *rubra*, *L.*
 † *Spindalis Protrei*, *Less.*
Spiza ciris, *L.*
 " *cyanea*, *L.*
Coturniculus passerinus, *Wils.*
Passerculus Savanna, *Wils.*
Emberiza pallida, *Aud.*
 * *Euethia lepida*, *L.*
 * " *canora*, *Gmel.*
 * *Melopyrrha nigra*,
 † *Macrocerus tricolor*, *Vieill.*
 † *Conurus Guyanensis*, *L.*
 * *Chrysotis leucocephalus*, *L.*
Picus varius, *L.*
 † *Campephilus principalis*, *L.*
 * *Chloronerpes percussus*, *Temm.*
 * *Centurus superciliosus*, *Temm.*
 * *Colaptes auratus*, *L.*
 * " *chrysocaulosus*, *Gundl.*
 † " *Fernandinae*, *Vig.*
 * *Saurothera Merlini*, *Orb.*
 † *Coccyzus Americanus*, *L.*
 " *erythrophthalmus*, *Wils.*
 " *seniculus*, *Lath.*
 * *Crotophaga ani*, *L.*
 * *Priotelus temnurus*, *Temm.*
 * *Chlorocenas inornata*, *Temm.*
 * *Patagioenas leucocephala*, *L.*
 * " *Corensis*, *Gmel.*
 * *Starnocenas cyanocephala*, *L.*
 * *Geotrygon Martinica*, *L.*
 * " *montana*, *L.*
 * " *caniceps*, *Gundl.*
 * *Chamaepelia passerina*, *L.*
 * *Zenaida macroura*, *Bon.*
 * *Perisura Carolinensis*, *L.*
 * *Ortyx Cubanensis*, *Gould.*
 * *Gallinula galeata*, *Pr. Max.*
Porphyrio Martinica, *L.*
 * *Fulica Americana*, *Gmel.*
Ortygometra Carolina, *Bon.*

- Ortygometra Jamaicensis*, *Steph.*
 * *Ballus elegans*, *Aud.*
 * " *crepitans*, *Lath.*
 † " *minutus*, *Gundl.*
 " *Virginianus*, *L.*
 " *variegatus*, *Gmel.*
 † *Aramus guarana*, *Illig.*
 * *Parra jacana*, *L.*
 * *Grus Canadensis*, *L.*
 * " *poliophæa*, *Wagl.*
Charadrius helveticus, *Gmel.*
 " *marmoratus*, *Wagl.*
 * " *vociferus*, *L.*
 * " *Wilsonius*, *Ord.*
 " *semipalmatus*,
 * " *melodus*, *Ord.*
Hæmatopus palliatus, *Temm.*
Streptilas interpres, *L.*
Calidris arenaria, *L.*
Tringoides Bartramius, *Wils.*
 " *macularia*, *L.*
Tringa rufescens, *Vieill.*
 " *pectoralls*, *Bon.*
 " *Schinzii*, *Brehm.*
 " *pusilla*, *Wils.*
 " *himantopus*, *Bon.*
Hemipalama semipalmata, *Wils.*
 " *minor*, *Gundl.*
Totanus chloropygius, *Vieill.*
 " *flavipes*, *Lath.*
 " *vociferus*, *Wils.*
Catoptrophorus semipalmatus, *Lath.*
 " *speculiferus*, *Cuv.*
Limosa fedoa, *L.*
Numenius longirostris, *Wils.*
Gallinago Wilsoni, *Temm.*
Limnodromus Noveboracensis, *Gmel.*
Recurvirostra Americana, *L.*
 * *Himantopus nigricollis*, *Vieill.*
 † *Tantalus loculator*, *L.*
 * *Eudocimus albus*, *L.*
 † *Falcinellus Ordii*, *Bon.*
 † *Platalea ajaja*, *L.*
 * *Nycticorax Gardeni*, *Jard.*
 * " *violaceus*, *L.*
Botaurus lentiginosus, *Sw.*
 * *Ardea herodias*, *L.*
 † *Herodias occidentalis*, *Aud.*
 * *Herodias Pealii*, *Bon.*
 † " *rufescens*, *Bon.*
 * " *egretta*, *Gmel.*
 * " *candidissima*, *Gmel.*
 * " *Ludoviciana*, *Wils.*
 * " *cærulea*, *L.*
Ocniscus virescens, *L.*
 " *brunnescens*, *Gundl.*
 † *Ardetta exilis*, *L.*
 * *Phœnicopterus ruber*, *L.*
Anser hyperboreus, *L.*
 " *Gambeli*, *Hartlaub.*
 * *Dendrocygnus arborea*, *L.*
 † " *viduata*,
 † " *sponsa*, *Sw.*
 † " *spinosa*,
Mareca Americana, *Lath.*
Dafila acuta, *L.*
Anas boschas, *L.*
Querquedula Carolinensis, *L.*
Pterocyanæa discors, *L.*
 " *cyanoptera*, *Vieill.*
Rhynchosapis clypeata, *L.*
Fuligula ruftorques, *Bon.*
 " *marila*, *L.*
Clangula albeola, *L.*
Nyroca valisneria, *Wils.*
Mergus cucullatus, *L.*
 * *Phalacrocorax Floridanus*, *Aud.*
 † " *Mexicanus*, *Brandt.*
 * *Plotus anhinga*, *L.*
 † *Fregata aquila*, *L.*
 * *Pelecanus fuscus*, *L.*
 † *Sula fusca*, *Vieill.*
 * *Larus atricilla*, *L.*
 " *marinus*, *L.*
 " *argentatus*, *Bris.*
 † *Sylochelidon Cayennensis*, *Gmel.*
 † *Thalasseus acufavidus*, *Cabot.*
 † *Gelochelidon aranea*, *Wils.*
 † *Hydrochelidon Surinam*, *Gmel.*
 * " *fuliginosa*, *Gmel.*
 * *Sternula frenata*, *Gould.*
 * *Anous stolidus*, *L.*
 * *Sylbeocyclus Carolinensis*, *Lath.*
 * " *Dominicus*,
 † *Phaëton flavirostris*, *Brandt.*

Dr. Brewer also presented a paper by M. F. Germain, of Santiago, entitled, "Notes upon the Mode and Place

of Nidification of some of the Birds of Chili," as follows:—

1. *Pontoaëtus melanoleucus*, vulg. *Aguila*, builds a nest sometimes on the top of an old tree at the foot of a steep rock, but more frequently upon the most inaccessible part of the rock itself. It lays two eggs, generally in September and October. It does not defend its nest.

2. *Polyborus tharus*, vulg. *Traro*, builds its nest on the top of large trees in plains and wooded ravines. The time of laying extends from July to November. It lays two or three eggs.

3. *Milvago chimango*, vulg. *Tingue*, conceals its nest among the branches of trees of medium size. It prefers damp places, and lays from two to four eggs. The time of laying is from October to November.

4. *Buteo erythronotus*, vulg. *Aguilucho*, lays two eggs. It places its nest in the cavity of a rock or on the top of a gigantic tree. It builds in October and November, and seems to prefer ravines which border upon the sea.

5. *Crazirix uncinatus*, vulg. *Peuco*, lays two or three eggs. It conceals its nest in the top of bushy trees. The time of the laying extends from September to March.

6. *Falco sparverius*, vulg. *Cerniculo*, lays in October or November four or five eggs, which it conceals in hollow trees. I have never found one of their nests built in the branches.

7. *Glaucidium nanum*, vulg. *Chuncho*, lays two eggs in the hollows of trees. The time of laying extends from September into November.

8. *Strix perlata*, vulg. *Lechuza*, lays sometime during November from three to five eggs in a hollow tree, or in the cavities of the cliffs which border most of the rivers of Chili.

9. *Stenopsis parvulus*, vulg. *Gallina ciega*, lays in November two eggs, which it deposits on the ground, without any trace of a nest; it chooses solitary and waste places covered with scanty vegetation.

10. *Cypselus leucopygius*, vulg. *Golondrina*, lays from September into December three or four eggs, in a nest poorly constructed, consisting almost entirely of a heap of feathers, which

it places sometimes under the tiles of roofings, sometimes in the hollow of a tree.

11. *Synallaxis ægythaloïdes*, vulg. *Colilarga pingueridita*, lays in October or November from two to four eggs, in a nest badly constructed, composed of straws and feathers, which it places sometimes in the hollow of a tree, sometimes in the thatch which covers the huts of the peasants.

12. *Synallaxis dorso-maculata*, vulg. *Trabajador*, lays in September or October three or four eggs, in a nest skilfully made, which it attaches to the reeds and rushes of the marshes of the province of Santiago.

13. *Synallaxis sordida*, vulg. *Canastero*, lays in September and October two or four eggs, in a nest skilfully constructed, which it places from three to six feet from the ground, in lonely places which are covered with low and thorny shrubbery, sometimes even on the *Cereus quisco*. This nest, a foot in length, is cylindrical, and composed entirely of little thorny branches. The opening is in the side near the top, and forms a passage in the upper part, which conducts to the lower part, which alone is provided with feathers to receive the young.

14. *Cinclodes nigrofumosus*, vulg. *Molinera*, lays in the hollows of the cliffs on the borders of streams. It collects water-plants and builds of them a rude nest, on which it deposits two or three eggs. The time of laying embraces the months of October and November.

15. *Troglodytes platensis*, vulg. *Chercan*, builds a large nest of pieces of wood, straw, thread, wool, and feathers. This nest, badly made and badly fastened, is not durable. It is placed indiscriminately in the holes of trees, or of cliffs, in old walls, and even under the tiles of houses; it lays from September to November from three to six eggs.

16. *Scytalopus fuscus*, vulg. *Ohurrin*, lays in October or November two eggs, in a nest rather badly made, which it conceals under brushwood in the vegetable detritus, and which it approaches through a gallery or corridor, made in the same materials in which the nest is placed. The solitary and wild habits of this bird make it not only difficult to find its nest, but even to see it or to shoot it.

17. *Cyanotis omnicolor*, vulg. *Sietecolor*. This pretty little

bird suspends its nest from the rushes in the swamps of the province of Santiago, and lays from two to four eggs in the months of September and October.

18. *Pteroptochus albicollis*, vulg. *Tapaculo*, lays in October and November two eggs, in a badly-made nest, which it places in the holes of cliffs, or oftener in the empty galleries of the *Octodon Cumingii*.

19. *Muscisaxicola nigra*, vulg. *Colegial*, *pellejo del homo*, lays in October and November from three to four eggs, in a pretty little nest, which it builds upon the ground, principally in barren and pebbly places bordering on rivers.

20. *Mimus thenca*, vulg. *Trenca* or *Tenca*, lays in October or November three or four eggs, in a well-built nest, made on the outside of small branches and on the inside of straw and wool, which it places a little above the ground on shrubs.

21. *Agriornis lividus*, vulg. *Sortal mero*, lays in October and November two or four eggs, in a badly-made nest, placed in the holes of cliffs.

22. *Culicivora parvulus*, vulg. *Torito cachudito*, lays from September to November from two to four eggs, in a small nest, which it places in shrubbery, even in nettles, a few feet from the ground.

23. *Tanioptera pyropa*, vulg. *Diucon papamoscas*, lays in October and November from three to four eggs, in a nest made of pieces of wood, straw, and moss; this is found sometimes in holes on the edges of cliffs, sometimes on trees at the junction of the branches, even at the height of from six to twelve feet.

24. *Myiobius albiceps*, vulg. *Arriero*, *Chiflador*, lays from November to January from two to three eggs, in a pretty nest, which it builds in the thick foliage of shrubs.

25. *Leichenops erythropterus*, vulg. *Rurrun*, lays from two to three eggs in a nest which it builds in the course of November, and which it places on the ground in marshy and moist places. I ought to rectify here an error in Mr. Gillis's work on Chili, in regard to the female of this species, which is no other than his *L. erythropterus*. I am perfectly sure of this fact.

26. *Turdus fuscater*, vulg. *Sorral*, lays from October to November three or four eggs, in a nest constructed and lined with moss, which it places a little above the ground in shrubs.

27. *Agelaius theleus*, vulg. *Trile*, lays in October three or four

eggs, in a well-made nest, which it often builds among grain, sometimes on the ground, sometimes suspended to the stalks; but generally it places its nest in moist places, among aquatic plants; at other times it is fastened to rushes, or the branches of trees, which hang over the water.

28. *Psarocolius Curæus*, vulg. *Tordo*, lays in November three or four eggs, in a nest made with earth, furnished outside with thorns and inside with moss.

29. *Sturnella militaris*, vulg. *Loica*, lays three or four eggs, in a badly-made nest, composed of weeds, always placed on the ground, and almost buried at the foot of plants.

30. *Chlorospiza alaudina*, vulg. *Duiquita*, builds its nest in September or October, and always places it on the ground at the foot of shrubs, in mountainous and arid places. It lays three or four eggs.

31. *Phrygilus diuca*, vulg. *Diuca*, lays from July to January three or four eggs, in a large and well-made nest, which it places near the ground in low bushes.

32. *Zonotrichia matutina*, vulg. *Chincol*, lays from September to November two to four eggs, in a rudely-constructed nest, which it places indifferently on the ground or a little elevated in bushes, and sometimes in the hollows of trees or cavities in cliffs.

33. *Grithagra brevirostris*, vulg. *Chirigue*, lays in October three or four eggs, in a slight nest, which it places in the grain-fields or meadows, either on the ground or a little above it.

34. *Phytotoma rara*, vulg. *Rara*, lays from September to November two or three eggs, in a well-made nest, furnished outside with thorns and inside with moss and grasses. It places the nest near the ground, in the thickest-leaved and most tufted bushes.

35. *Picus lignarius*, vulg. *Carpintero*, hollows its nest in the branches of decayed trees, and lays two or four eggs, on the bare wood, in October or November.

36. *Columbina picui*, vulg. *Tortolita cuyana*, lays in September or October, in hedges, two eggs, in a flat nest, badly made, and composed of small branches.

37. *Peristera auriculata*, *Zenaida aurita*, vulg. *Tortola*, lays two eggs in October, in a flat and simple nest, which it places a little elevated, in the branches of trees in ravines.

38. *Nothura perdicaria*, vulg. *Perdiz*, lays from August to

November six to ten eggs, in the grain-fields and other places covered with grasses and a few shrubs. It does not make a nest, but makes a slight hollow in the earth with its feet.

39. *Vanellus Cayennensis*, vulg. *Guoltregue*, lays from July to November two to four eggs, in marshy places. It makes no nest, but hollows out a kind of cup in the clods of earth which are just above the water, and puts in it a few straws; this constitutes its nest.

40. *Ardea egretta*, vulg. *Garza grande*, unites in communities to lay, sometimes upon rocks at the sea-shore, sometimes on the trees in woody ravines, where it builds large nests with branches and grasses. It lays from four to eight eggs from October to November.

41. *Nycticorax Gardenii*, vulg. *Guayrabo*, unites in companies to nest. They build near together on the reeds, or on the bushes which surround the marshes. Their nests consist of a heap of bent rushes and little sticks of wood. They lay from three to five eggs in October or November.

42. *Himantopus nigricollis*, vulg. *Perrito*, lays in November three or four eggs in the marshes. For this purpose it chooses slight elevations, where it lays together a few dry grasses in the form of a nest. It manifests much courage when one approaches its nest.

43. *Ibis melanopsis*, vulg. *Bandurria*, in the month of October builds a rude nest in steep and rugged rocks, in which it deposits from three to five eggs. In the provinces of the south, it chooses for its nest the summits of dead, high, and inaccessible trees; in the north, it retires often for this purpose to the Cordilleras, to the height of seven or eight thousand feet.

44. *Falcinellus guarauna*, vulg. *Cuervo*. These assemble in numerous flocks for nesting, and lay from November to December four to six eggs in a nest of rushes, placed in the midst of reeds.

45. *Gallinago paraguia*, vulg. *Porotera*, from July to September lays two eggs, which it deposits in a rude nest composed of straw and dried grass, in swampy meadows.

46. *Rhynchæa semicollaris*, vulg. *Abecassina*, does not build a nest, but lays in September and October two or three eggs in marshes and inundated fields, depositing them on the mud or wet grass.

47. *Hæmatopus palliatus*, vulg. *Tiratira*, in October and November deposits two or three eggs on the sand near the borders of the sea.

48. *Rallus bicolor* (*cæsius*, Spix?), vulg. *Siden*, lays in October and November three or four eggs, which it deposits in a badly-made nest, composed of grass, which it conceals among the marshy plants.

49. *Gallinula crassirostris*, vulg. *Sollolla*, builds in October, on the border of small streams, a rude nest, in which it deposits three or four eggs.

50. *Fulica Chilensis*, vulg. *Tagua*, builds in September and October a large nest, composed of broken rushes heaped together, which it places in inundated marshes in the midst of the reeds, and there lays from four to eight eggs.

51. *Podilymbus antarcticus*, vulg. *Picurið*, builds on small streams a flat, floating nest, composed of wet grass, in which it lays in October and November three or four eggs.

52. *Larus glaucodes*, vulg. *Caguil*, (*Chellé* in Chiloë), assembles in flocks, in the last of November or during December, to lay their eggs. They retire for this purpose to lakes in the vicinity of the sea-shore, or to the rivers in the south of Chili. They build large floating nests, composed of grass and rushes, selecting places covered with rushes. In these nests they deposit two or three eggs.

53. *Larus Dominicanus*, vulg. *Garrota*, chooses for laying the summits of inaccessible rocks on the sea-shore, and deposits toward the last of November and in December two or three eggs, on a rock or upon the grass, with hardly any appearance of a nest.

54. *Sterna aranea*, vulg. *Chibrillo*, (*Chiliuta* in Chiloë), assembles in flocks, in November and December, to lay their eggs, and chooses for this sandy shores, depositing two or three eggs on the ground, without building a nest.

55. *Daylla Bahamensis*, vulg. *Pato jergon grande*, lays from five to eight eggs, from August to October. It chooses for its nest half-dry marshes, the borders of streams, and even grain-fields.

56. *Anas cristata*, vulg. *Pato juarjual*, retires to lay in the Cordilleras, at the height of from six to eight thousand feet. It uses peat bogs and small swamps in which to build a simple nest, wherein it deposits from four to six eggs.

57. *Anas melanocephala*, vulg. *Pato rinconero* ; 58. *Mareca Chilensis*, vulg. *Pato real* ; 59. *Querquedula caeruleata*, vulg. *Pato colorado* ; 60. *Q. creccoides*, vulg. *Pato jergon chico* ; 61. *Q. versicolor*, vulg. *Pato capuchino* ; 62. *Rhynchospis maculatus*, vulg. *Pato cuchara* ; 63. *Fuligula metopias*, vulg. *Pato negro*: all lay in the marshes of the central provinces. They build their nests from September to October, depositing from four to six eggs. The nest is generally filled with down, and composed of rushes.

64. *Micropterus cinereus*, vulg. *Quetru*, retires to lay in the islands of the archipelago of Chiloë ; it places its nest in the wildest and most solitary spots, and furnishes it with a great quantity of down ; it lays four or five eggs in December or the last of November.

65. *Cygnus nigricollis*, vulg. *Cisne*, lays from four to six eggs in rather a large nest ; the laying of the eggs takes place between June and August, and the nest is placed among the reeds of the marshes, lakes, and rivers of the republic.

66. *Graculus Brasilianus*, vulg. *Yeco*, (*Cuervo* in Chiloë), chooses the rocks on the sea-coast, or trees which border certain lakes or pools, to make its nest ; the laying takes place in October and November ; for this they collect in great numbers, and make large nests of marine or aquatic plants, (which at the end of several days give forth an offensive smell), and deposit therein three or four eggs.

67. *Graculus cristatus*, vulg. *Lilé* (in Chiloë), *Guamay* (in Conception), collects in flocks to lay its eggs, and for this chooses the inaccessible rocks of the archipelago of Chiloë, upon the summits of which, surrounded by water, they place all their nests, near together, constructed of marine and decaying plants ; they lay from two to four eggs in December.

68. *Graculus Gainsardii*, vulg. *Sato Lirio*, (*Lilé* in Chiloë,) lays in November. They choose for their nests the crevices of rocks which rise perpendicularly from the sea, at the foot of which the waves dash ; they are made of marine and decaying plants. The eggs are three or four.

69. *Graculus Magellanicus*, vulg. *Lilé*, collects in flocks in December, laying from two to four eggs. They choose the perpendicular rocks of the islands of the archipelago of Chiloë, and in the steepest part they build a nest of marine and decaying plants.

Besides these sixty-nine species, the eggs of about fifty others can be procured, inhabitants of the Cordilleras, of the sea-coast, or of some of the intermediate plains. But with all diligence it is impossible to make a complete collection from so many different points in the short space of a season; and it will not answer for this kind of collection, whose principal merit consists in authenticity, to trust to the words of the natives. There exist a great number of birds on the sea-coast and in the Cordilleras, whose eggs probably will be procured another season. As, unfortunately, the month of November is the time chosen by the greater part of the species for hatching, a complete collection should not be expected until after three years of search. Some of the eggs, sent in numbers, present quite a difference in form and color, and often four or five varieties have been selected from more than fifty specimens. The authenticity of all the eggs of this collection, now in the cabinet of the Smithsonian Institution, may be depended on, as they were personally collected by Mr. Germain, up to December, 1859.

The Committee appointed at the last meeting to nominate a candidate for the Curatorship of Conchology reported the name of Mr. Nathan Farrand, of Boston; and he was unanimously elected.

Mr. Roswell Field, of Greenfield, Mass., made a verbal communication on the footmarks of the Connecticut river sandstones.

Several years ago he came to the conclusion that these tracks were not made by birds, and this conclusion has been confirmed by the examination of great numbers of specimens since. Though some of them look like bird tracks, there is much negative evidence that they are not so; his opinion is that they were made by four-footed animals, in most instances reptiles, and perhaps in a few cases marsupial mammals like the kangaroo; the tracks frequently do not correspond to those of birds, and the marks of small anterior feet and a dragging tail are often perfectly distinct. He believes Dr. Hitchcock has fallen into many errors in considering the animals that made these tracks as birds, or even

bird-like. Why bones have not been more often discovered he cannot explain; the few specimens found are not those of birds, though hollow, but reptilian (allied, as the President remarked, to those of the pterodactyl).

Dr. Bryant, on again examining the humming-bird called by him *Trochilus Bahamensis*, found that it possesses ten rectrices like the other members of the family.

The two central tail feathers are nearly covered by the upper tail coverts, and are of the same bronze green color; they are much shorter than the rest, though not sufficiently so to be considered abnormal.

The President made some remarks on the anterior and posterior symmetry of the limbs in man and animals, showing that the arms and legs are to a certain extent repetitions of each other.

Prof. Robert E. Rogers, of Philadelphia, was chosen a Corresponding Member.

Drs. Francis P. Sprague and G. H. Nichols; Messrs. Nathaniel Bowditch and George H. Snelling, of Boston; Rev. Joseph H. Allen, of Jamaica Plain; and Mr. Thomas S. Moore, of Cambridge; were chosen Resident Members.

June 20, 1860.

The President in the Chair.

Prof. William B. Rogers made a Report upon the Registering Thermometer of Dr. James Lewis, of Mohawk, N. Y., the consideration of which had been referred to him at a former meeting.

In describing the construction and operation of the instrument, he exhibited an enlarged drawing of the whole apparatus and its several parts, together with specimens of the records as actually made by it, and of the curves of mean temperature derived from them, which had been furnished by the inventor.

The part of the instrument forming the thermometer proper consists of a cylindrical bundle of iron and brass wires (No. 13), about 15 inches in length, so arranged as to be equivalent to about forty-five inches of iron wire antagonized by about an equal length of brass wire. The bundle is composed of five pairs, two of brass and three of iron, arranged alternately around the centre, and a single wire of brass, equivalent in action to a third pair of that metal, placed in the axis of the cylinder.

The upper end of the central wire, moved by the difference of expansion of the two metals, operates upon the short arm of the first of a train of two levers, and through them upon the axle of a pulley. To the grooved circumference of the larger wheel of this pulley is attached a slender silk cord carrying the *registering point* designed to mark the temperature, and which, by the multiplying effect of the mechanism, is moved over a space three hundred and twenty times as great as the differential expansion or contraction of the wires.

The registering point, properly balanced by an attached weight, and guided in its vertical movements by two slender parallel rods, is made to record the temperature on a fillet of paper moved by a train of cylinders whose axes are parallel to the guide wires. The record is impressed by the impulse of a hammer striking upon the back of the registering point at regulated intervals, and thus producing a series of small perforations in the paper, the hammer and the fillet of paper both receiving their motion from a train of clock-work of peculiar construction connected with the apparatus.

The projecting shaft of the pulley carries an index, which, revolving in front of a dial-plate placed over the pulley, enables the observer to note the temperature as compared with the ordinary thermometer, and to adjust the rod-thermometer to the standard whenever necessary. The adjustment is made by turning a screw connected with the lower end of the central brass wire of the thermometer. The latter instrument is on the outside of

the case which incloses the dial, registering apparatus, and clock. By a peculiar arrangement of the clock-work, the hammer movements, and therefore the times of registration, may be adjusted to quarter-hour, half-hour, or hour intervals, and may be changed from one to the other at the will of the observer.

As regards the performance of this very ingenious instrument, Prof. Rogers had obtained many interesting facts from Dr. Lewis, illustrating its great sensitiveness as compared with the common mercurial thermometer, and showing the comparative steadiness and accuracy of its registration within the small limits of error due to the friction and thermal disturbances to which it is exposed. The inventor, with laudable disinterestedness, asked for a thorough scrutiny of the practical value of his contrivance. While offering information to others, he was himself a severe critic of its daily workings, and has been led since its first construction to introduce various modifications adapted to reduce resistance, to exclude radiation, and otherwise to improve its fidelity in appreciating and registering the changes of temperature. A somewhat longer experience may be needed to discover all the peculiarities of action incident to the construction of the instrument, and to give it the permanent reliability for minute registration at which the inventor aims.

Looking to the general principle of the instrument, and to the improvements thus far made in it, and relying on the faithful observation, as well as the ingenuity of Dr. Lewis, for giving it all the accuracy and permanent reliability of which it is capable, Prof. Rogers felt it his duty to commend the registering thermometer of Dr. Lewis to the Society, as an instrument worthy the critical examination of men of science, and one which promised to become a valuable help in meteorological observation.

Dr. A. A. Gould presented, in the name of Mr. Charles A. White, a paper entitled "Observations upon the Geology and Paleontology of Burlington, Iowa, and its Vicinity." It will be published in full in the Journal of the Society.

Prof. Rogers remarked on the importance of the facts set forth in the paper of Mr. White, not merely as

giving greater precision to our knowledge of the interesting locality to which they relate, and adding many new forms to the catalogue of our paleozoic fossils, but as helping to illustrate geological questions of wide application and interest in the philosophy of the science.

The *gradual passage* from a Devonian to a carboniferous fauna, previously noted in this locality by Prof. Hall, and now so clearly exhibited by Mr. White, belongs to a class of phenomena of which not a few examples have been brought to light in other parts of the geological series, and of which many more will doubtless be discovered in the progress of a critical and philosophical survey of fossiliferous deposits. Prof. Rogers considered such a gradational change, or such a mingling of races in successive formations, as but the natural result of the accumulation of the strata during a long period of comparative repose. He believed that the abrupt transitions so often observed in passing from one geological formation to another were not, as some maintain, an essential feature in the life-history of our earth, but were the memorials of the disturbing and destroying agencies to which its living races had been successively exposed. These hostile influences have at no time been of equal intensity over widely extended areas, but varying from region to region have in some places arrested only in part the stream of living descent, thus substituting for the abrupt transition which marks the successive faunæ of one district, the gentle gradations and intermingling of forms presented by the corresponding deposits of another.

Referring even to the limits of the great paleozoic divisions, so often defined by sharp lines of separation, observation has shown that in some localities the transition is so gradual as to present no greater amount of change in fossil forms than occurs in passing from one subordinate formation to the next. Hence we find that the ablest European geologists are not agreed as to the line of separation between the Silurian and Devonian, or between the latter and the carboniferous deposits of some of their best-known districts, while recent observations in this country and abroad have tended to obliterate the presumed line of demarcation between the carboniferous and overlying Permian strata, wherever the transition beds are most completely developed.

As regards the passage from the Devonian to the Carboniferous series, Prof. Rogers remarked that the observations of Mr. White on the Burlington strata had their counterpart in those of Griffith, Jukes, McCoy, and other Irish geologists, who have been led to include in the lower Carboniferous series of Ireland a thick group of deposits which Murchison and others place in the Devonian. Indeed, according to McCoy's determinations, the carboniferous limestone of Ireland contains among its fossils quite a number of forms identical with those of the Devonian rocks, as well as many that belong also to the Upper Silurian.

These facts and considerations lend support to the view that the changes of fossil faunæ are more gradual in proportion to the degree in which the successive deposits of a given period have been preserved from destruction, and certainly favor the doctrine of a gradational continuity in the succession of living races rather than that of sudden underived creations.

Looking to the question of the equivalency in time of the rocks described in Mr. White's paper with deposits in the eastern and southeastern parts of the Appalachian basin, we are struck with the enormous thickness of the several groups of strata in the latter region, which find a representation, as to period, in the inconsiderable mass of calcareous and other beds, occupying, in this western locality, the interval between rocks of unequivocally Devonian and Carboniferous ages. In this part of the Appalachian area, the interval referred to includes not only the vast thickness of red and variegated strata of the Ponent or Catskill series, but in Pennsylvania and Virginia a great mass of conglomerate, sandstone, and shale, containing in some districts considerable seams of coal, the whole attaining in places an aggregate thickness of more than six thousand feet. This latter, or Vespertine series, maintaining a position always below the shales and limestones charged with *Archimedes (Fenestella) Pontremites*, and other carboniferous limestone fossils, and forming a lower carboniferous group corresponding to that of Scotland and Nova Scotia, may perhaps claim a place on the same time-level with the portion of the Burlington group in which the carboniferous forms have assumed predominance, or may extend in period as far as the lower Archimedes or Keokuk limestone.

But all such attempts at synchronizing distant deposits must be

limited to a general and vague result. Even when corresponding fossils would seem to mark a simultaneous origin, we must not forget the large agency of migration, and the long lapse of years which in many cases may have been required for the extension of a living race into distant submarine settlements.

Prof. W. B. Rogers referred to some observations communicated to him by Mr. L. W. Bailey, in relation to an interesting locality of Diatomaceæ, at Oaklands, North Providence. From an examination of the spot, Mr. Bailey has furnished the following brief description:—

“The locality is a pond of several hundred feet in circumference, in a natural basin somewhat enlarged, lying to the eastward of the dwelling of Mr. A. Eaton, on whose estate it is situated, and who was the first, I believe, to notice the deposit. Near the side of the pond are several constant springs running into it, and in the vicinity of these we find a white, soft earth, which, on examination, proves to be entirely composed of the siliceous epiderms of Diatomaceæ.

“It was late in the winter when the deposit was first pointed out to me, and even at that inclement season I found living Diatoms quite abundant in the pond, of the some character, for the most part, as that of the fossil bed. At the present time, (May,) the pond is very rich in specimens of all the forms represented in my drawings, besides many beautiful Desmidiæ, Confevæ, and Infusoria of every description.

“As to the extent of the deposit, I have been able to learn but little, owing to the depth of the pond, the abrupt descent of its bank, and the general swampy character of the ground. The layer of Diatoms crops out distinctly at only one point, where it is several feet thick; but from various facts I should infer that the deposit extends over a space much larger than the present area of the pond. The surrounding field of ploughed land is filled, at some distance from the pond, with small white and powdery lumps, probably upturned by the plough, which, under the microscope, are found to be made up entirely of the same forms as the pond deposit.

"This locality seems to me an interesting one on account of the large mass of the deposit and its remarkable exemption from foreign matters, as well as the extraordinary size and distinctness of most of the included forms. I hope from future examinations to be able to present a more complete account of the locality, and of its interesting microscopic remains."

Dr. A. A. Gould presented the following descriptions of new shells collected by the United States North Pacific Exploring Expedition:—

TEREBRATULA TRANSVERSA. *T. reniformis, distorta, transversa, tenuis, rufo-flavescens, punctata, costis radiantibus angulatis ornata; valvis flexuosis, convexiusculis lateraliter angulatis; margine cardinali recto; apice vix eminente; foramine magno interrupto; apophysi libero, imprimis exili deinde aculeo divergente munito, denique membranaceo et in laqueo recurvo protracto. Long. 6; diam. transv. 8; lat. 4 poll. Inhabits Hakodadi Bay. W. S.*

Like *T. Grayi* as to form, color, and sculpture; the internal supports are much shorter, and the diverging processes and membranous loop are also characteristic.

TEREBRATELLA MINIATA. *T. magna, rhomboideo-ovalis, globoso-lenticularis, punctata, striis incrementi solum insculpta, miniata; valvâ ventrali ventricosâ, sulco mediano modico fluctuatâ, costâ acutâ medianâ intus munitâ; margine postico vix angulato; valvâ dorsali tectiformi, anticè subtruncatâ, posticè rostratâ; foramine modico, integro; apophysi primò gracili, dein subitò latè expanso et ad cristam medianam affixo, denique reflexo et laqueam efformante. Diam. long. et transv. 1.5 poll.; alt. $\frac{7}{8}$ poll. Inhabits Hakodadi Bay. W. S.*

In size, form, and color much like *T. rubra* or *Zelandica*, but less fan-shaped and entirely destitute of radiating furrows or ribs. The surface is like *T. lenticularis*, but is proportionally shorter and trilobately waved. It is, moreover, generically distinct by the union of its apophyses with the central crest.

RHYNCONELLA LUCIDA. *T. subcircularis, tenuissima, lucida, dilutè cornea, valvis subæqualibus, ventricosis, impunctatis, sub*

lente radiatim striata; foramen integrum, parvum; cardo ut in Rhyconellâ; apophyses? Diameters about $\frac{1}{4}$ inch. Dredged off Japan Coast, $30^{\circ} 35' N.$, $130^{\circ} 40' E.$, in 110 fathoms, sand, by Capt. Stevens, of the "Hancock."

Might be taken for a small *T. vitrea*, but is very thin and delicate, and further distinguished by its destitution of punctures.

DISCINA STELLA. *T. parva*, discoidea, plano-convexa, tenuis, ex apice vix eœcentrico levigato demum radiatim striata; valvâ inferiori posticè truncatâ, disco rimato cardiformi; limbo radiato, radiis filiformibus admodum articulatis; margine ciliato. Diam. $\frac{1}{4}$ poll. circiter. Adhering to shells dredged in the China Sea. W. S.

A specimen in Mr. Cuming's collection is much larger. Young specimens are quite destitute of radiating lines.

TRICHOTROPIS ELLIPSOIDEA. *T. parva*, tenuis, ovata, albida, liris quadratis (interspatiis clathratis) cincta; anfr. 6 ventricosi; suturâ canaliculatâ; epidermide tenui, liris ciliatis: apertura ovata, anticè acutè rostrata; labro simplici, arcuato; margine columellari tenui, erecto; umbilico parvulo. Axis 10 millim.; diam. 5 millim. Dredged in Hong Kong Bay. W. S.

Has the aspect of *T. inermis*, as figured by Middendorff, but is smaller, much more elongated, and the pillar and canal are quite different.

TRICHOTROPIS (Iphinœ) CORONATA. *T. ovato-rhomboides*, turrita, tenuis, cinerea, epidermide fibroso ad carinam in fimbriam cirrosam producto induta; umbilico lato, profundo, acutè marginato; anfr. 6+ citò crescentibus, posticè tabulatis, ad angulum carinatis: apertura ovato-triangularis, labro simplici; columella recta, anticè vix reflexa, acuta, subcanaliculata: operculum ovatum, corneum, apice terminali. Long. 25 millim.; lat. 15 millim. Hab. Arctic Ocean, Straits of Semiavine, 20 fathoms, mud. W. S.

May, perhaps, be *T. ciliata*, Kruger, which I have not seen. A very curious and elegant species.

RINGICULA DENTICULATA. *T. ovata*, acuminata, solida, lactea, striis confertis transversis (exiliioribus interdum interveni-

entibus) insculpta; anfr. 5 ventricosis: apertura angusta; labro admodum incrassato intus denticulato, ferè ad sinum siphonalem interrupto; plicis acutis, transversis; callo modico, haud appresso; dente parietali modico. Axis 5 millim.; diam. 3.5 millim. Inhabits Port Jackson, N. S. W. W. S.

The numerous striae, denticulate labium, and scantiness of callus about the siphonal notch, mark this species.

RINGICOLA DOLIARIS. T. majuscula, tenuis, ventricosa, ovata, albida; spira acuminata, anfr. 4 rotundatis, sulcis transversis remotis insculptis, ultimo amplo; suturâ profundâ: apertura magna, labio angusto, haud incrassato, plicis columellæ tenuibus, acutis, plicâ parietali parvâ, tenui; callo siphonali modico. Axis 5 millim.; diam. 3+ millim. Inhabits Hakodadi Bay, 6 fathoms, sandy mud. W. S.

Peculiar from its thin lip and general want of callus.

RINGICOLA ARCTATA. T. solida, ovata, acuminata, alba; spiræ anfr. 4+ convexis, ultimo striis volventibus (10-12) insculpto; suturâ profundâ: apertura auriculata, labro incrassato, intus tumido; plicis ad columellam conspicuis; dente parietali robusto, usque ad angulum posticum aperturae protracto; callo labiali lato, sinum siphonalem transeunte. Axis 4; diam. 3 millim. Inhabits Hong Kong Harbor. W. S.

Allied to *R. caron* and *propinqua*, but the sculptured lines are much more crowded.

BUCCINUM STIMPSONI. T. magna, solidula, elongata, fusi-formi-turrita, cinerea vel dilutè ferruginea, epidermide calcareâ caducâ incrustata, lineis tenuibus cincta; anfr. 6 ad 8+ pyramidalis, pentagonalibus, ultimo anticè excavato, costâ cincto ubi undæ terminantur. Apertura dimidiam longitudinis testæ adæquans, angustè lunata; labro simplici; columellâ arcuatâ, callosâ; fauce dilutè castaneâ vel lividâ. Long. 100; diam. 45 mill. Habitat Arikamcheche Island, Behring's Straits. W. S. Dredged in Arctic Ocean. Capt. Rodgers.

A quite remarkable species, allied to *B. undatum*, but at once distinguished by its elongated form, and its pyramidal, pentagonal whorls with concave sides.

BUCCINUM RODGERSI. T. ovato-lanceolata, solidula, luteo-cinerea crustâ cretaceâ sub epidermide tenuissimâ induta, strii exillissimis cincta; anfr. 8 tumidulis spiram elongatam nunc undulatam nunc æquam efformantibus, ultimo trientes duas long. metiente et in rostram satis productam sensim contracto. Apertura ovata dimidiam long. testæ haud æquans, labro evaso, posticè sinuate; columellâ callo benè indutâ; fauce flavidâ vel lividâ. Long. 55; diam. 25 millim. Inhabits Arikamcheche Island, Behring's Straits. W. S. Common in 20-30 fathoms, muddy gravel, Arctic Ocean, north of Behring's Straits. Capt. Rodgers.

Like *B. undatum* the varieties are very widely contrasted as to the undulation of the surface, and but for the uniformly slender growth and elongated beak might possibly have been brought under that species.

NEPTUNEA (s. g. Siph) TEREBRALIS. T. elongata, ovato-fusiformis, rufo-cornea, externè cretacea longitudinaliter ordinatim striata, costis et fossis subæqualibus (anfr. spiræ ad 8) cincta; anfr. 7+ rotundatis supernè tabulatis, ultimo trientem long. testæ adæquante. Apertura pyriformis, rostro modico, labro arcuato, intus denticulis submarginalibus instructo et strigis rufis costis respondentibus ornato. Axis 60 millim.; diam. 25 millim. Inhabits Arctic Ocean.

In general form, like *N. Islandica* excepting as to the angularity of the posterior part of the whorls, but clearly distinguished by the exterior ribs and grooves. The lip is broken, but there is a specimen from Spitzbergen, in good condition, in Mr. Cuming's collection, from which I have taken the character of the lip.

NEPTUNEA ARATA. T. parva, ovato-fusiformis, solidula, rufo-cinereascens, striis profundis incisa et striis incrementi concinnè clathrata; anfr. 5+ ventricosus ad suturam declivibus, undulatis, ultimo subvaricoso; sutura exili. Apertura pyriformis, dimidiam long. testæ adæquans, labro acuto, serrulato, intus denticulato; columellâ subperforatâ, callo rufo indutâ. Axis 23 millim.; diam. 10 millim. Inhabits ——?

NEPTUNEA ÆSTUOSA. T. ovata, solida, fulvo-cinerea, sulcis angustis remotis cincta, et fluctibus obliquis ad 12 ornata; anfr.

5+ tumidis posticè carinatis et apud fluctus subnodosis, versus suturam declivibus. Apertura lunata, labro acuto intus sulcato; columellâ admodum excavatâ; rostro brevi valdè recurvo. Axis 45; diam. 25 millim. Inhabits Kagosima. W. S.

EUTHRYA LACERTINA. T. ovato-fusiformis, longitudinaliter undulata et strigis rufis ornata, ad peripheriam pallidè zonata; anfr. 6 convexis propè suturam constrictis, et filis confertis cinctis. Apertura dimidiam long. testæ adæquans, lunata, posticè acuta; labro arcuato, crenulato, intus sulcato, sulcis fusco tinctis; columellâ flexuosâ; rostro brevi, lato. Axis 25 millim.; diam. 10 millim. Inhabits Simon's Bay, Cape of Good Hope. W. S.

Resembles *Pisania D'Orbigny* or *P. maculosa*; but the furrows within the lip, want of posterior callus, and shortness of canal, as well as general form, distinguish it.

PISANIA MOLLIS. T. elongata, ovato-rhomboidea, subtenuis, cinerea, epidermide duracino induta; anfr. 6 convexis vix plicatis, posticis spiritaliter filosis, filis anticè liras duas efformantibus; anfr. ultimo $\frac{3}{4}$ long. testæ, liris anticè ad 8 et liris numerosis minoribus posticis cincto; suturâ profundâ. Apertura angusta, ovata; labro acuto denticulato; fauce sulcatâ, lividâ; columellâ vix callosâ; rostro satis elongato. Axis. 22 millim.; diam. 12 millim. Inhabits Simoda. W. S.

FUSUS MODESTUS. T. parva, elongata, ovato-lanceolata, rufis, fusco-cinerea, longitud. undulata (undis ad 15) et liris conspicuis ad 5, minoribus intervenientibus cincta; striis incrementi lamellosis; anfr. 7 tumidulis. Apertura ovata dimidiam longit. testæ haud æquans; labro simplici intus subsulcato; fauce castaneâ. Axis 25 millim.; diam. 6 millim. Inhabits Hakodadi, in 10 fathoms, shelly sand. W. S.

PERISTERIA FENESTRATA. T. parva, fusiformis, flavido-rubescens, liris exilibus confertis cincta, interspatiis concinnè clathratis, longitud. vix plicata, liris binis suturæ propinquis majoribus alveolas efformantibus; anfr. 6 convexis, ultimo anticè constricto; suturâ profundâ. Apertura ovata dimidiam longitud. testæ adæquans; labro concinnè crenato, intus sulcato; columellâ

callo erecto anticòe indutâ; rostro ferè clauso. Axis 13 millim.; diam. 6 millim. Inhabits Simon's Bay, Cape of Good Hope. W. S.

Only a single specimen was found; quite remarkable for the contraction about the beak, and the embrasure-like pits near the suture.

PERISTERIA INCULTA. T. parva, solida, fusiformis, rufa; anfr. 8 convexis ad suturam declivibus liris inæqualibus cinctis et fluctibus ad 7 ornatis, ultimo vix dimidiam longitudinis æquante, costâ basali inconspicuâ in dentem ad labrum productâ; rostro gracili contorto. Apertura rotundato-ovata; labro crenulato intus denticulato; columellâ leviter plicatâ; fauce luteâ. Axis 25 millim.; diam. 12 millim. Inhabits ——?

In the young stage, there is a long, delicate spine on the outer lip, as in *Leucozonia*, which becomes obsolete with age.

SISTRUM PARVULUM. T. parva, ovato-rhomboidea, fusco-cinerea, longitudinaliter ad 9-plicata et costis 5 nodulosis cincta; anfr. 5 angulatis, supernis erosis, costâ unicâ nodulosâ cinctis. Apertura angusta, lunata, dimidiam longitudinis testæ adæquans; fauce fuscocænte; labro fusco maculato intus albo-dentato; columellâ politâ. Long. 12; diam. 7 millim. Habitat Simon's Bay. W. S.

The color and nodulations are much as in *S. tuberculatum*, but the form is more rhombic, and the size much less.

NASSARIA CURTA. T. parva, elongata, ovato-rhomboidea, solidula, straminea ante suturam pallidior et fulvo maculata; anfr. 6+ ventricosus filis ad 8 volventibus et plicis ad 15 longitud. ornatis. Apertura angusta ovalis; labro incrassato intus denticulato; laminâ columellari erectâ; rostro modico, recto. Axis 10; diam. 6 millim. Inhabits Port Jackson. W. S.

It is smaller than any species in the Cuming Collection, and has a short beak. It is like *N. carduus*, Rv., but has more delicate waves.

MUREX (Ocinebra) IMPROBUS. T. parva, rudis, rhomboideo-fusiformis, lineis incrementi muriculata, cinereo-fulvida, strigis et fasciis obscuris rufescentibus et cingulo albido ornata; anfr. 6+

medio angulatis posticè excavatis vel declivibus, anticè plicas 7 ad 8 tuberculosas gerentibus, filis inæqualibus numerosis ubique cinctis quorum duobus anterioribus majoribus. Apertura dimidiam longitud. testæ adæquans, angusta, ovato-rhomboidæ; labro denticulato intus incrassato et sulcato; fauce citrinâ vel lividâ; columellâ politâ; rostro subperforato. Axis 25; diam. 12 millim. Inhabits China Seas, in sand, 25 fathoms. W. S.

Much like *O. buceus*, but shorter.

TROPHON INCOMPTUS. T. ovato-trigona, solida, rudis, cinerascens; spira turrata, anfr. 6 angulatis posticè tabulatis, ultimo ventricosos, trigono, liris inæqualibus (tribus majoribus) cinctis, longitudinaliter undulis inordinatis et laminis incrementi instructis. Apertura ovata posticè rotundata; labro simplici papillis paucis intus instructo; canali brevi recurvo ferè clauso; fauce castaneâ. Axis 30 millim.; diam. 16 millim. Inhabits Hakedadi. W. S.

Closely allied to *T. crassus*, which has the suture channelled and the lip dentate; young specimens have the laminae quite prominent, with small spines at the angles.

TROPHON SUPPOSITUS. T. pyriformis, turrata, tenuis, sordidè alba, laminis erectis remotis clathrata, interspatiis concavis lævibus; anfr. 6 convexis posticè tabulatis; ultimo bulboso anticè in rostrum tenuem recurvum protracto. Apertura ovata $\frac{2}{3}$ longit. testæ adæquans; columellâ porcellanâ. Axis 30 millim.; diam. 15 millim.; apertura long. 20 millim. Inhabits ———?

TRITON (Monoplex) FOSSATUM. T. solida, subglobosa, flavida; spira brevis, anfr. sex fossâ latâ profundâ sejunctis et costulis duabus cinctis (costulis striâ medianâ impressis) et undulas longitudinales noduliferas remotas gerentibus: apertura angusta, perobliqua posticè rotundata; labro varicoso, denticulato intus sulcato; labio erecto sulcato, sulco postico majori; rostro brevi. Axis 35; diam. 80; apert. 20 millim. Habitat, Hong Kong. W. S.

Like *T. canaliferus* this would be at once noticed for the deep sutural channel; but it is altogether of a short, ventricose form, with a very short canal. It approaches, in form and sculpture, to *T. doliarivus*, which lacks the canal and has a longer beak.

TEREBRA BIPARTITA. *T. parva*, subulata, gracilis, tenuis, nitida, ubique striis exilibus confertis cincta, et plicis modicis flexuosis ad 15 munita; anfr. 14 convexiusculis posticè leviter instrictis, posticè flavidis anticè castaneis, ultimo filo flavo cincto: apertura lunata; rostro curto, lato. Axis 15; diam. 4+ millim. Inhabits Hakodadi Bay, 20 fathoms. W. S.

TEREBRA ARGUTA. *T. parva*, gracilis, turrata, ad apicem lanceolata, ex stramineo rubescens; anfr. 12+ convexis, plicis ad 20 eminentibus acutis, ad interspatia lineis volventibus impressis et posticè striâ profundâ incis; ultimo anticè cancellato ad rostrum constricto: apertura perangusta, flexuosa; columellâ violaceâ. Axis 25; diam. 5 millim. Inhabits Porto Praya. W. S.

Closely allied to *T. violascens*, Hinds, from New Guinea.

TEREBRA PROLIKA. *T. modica*, subulata, subtenuis, nitida; anfr. 16 conicis, plicis ad 20 acutis parum elevatis ornatis, posticè striâ volvente incis; colore dilutè fulvo vittâ rufâ demum evanescente et vittâ pallidâ angulo postico aperturae exeunte ornato: apertura ovata; columellâ contortâ rufâ. Axis 33; diam. 8 millim. Off China Coast, in 25 fathoms, sandy. W. S.

A distinctly fluted species. *T. amœna* is smaller, shorter, and differently colored.

NASSA SUFFLATA. *T. ovato-conica*, ventricosa, subtenuis, cinerascens, fusco prope suturam tessellata etiam hic illic maculata, striis volventibus paucis anticè et striis binis posticè insculpta: spira acuta, turrata; anfr. 7+ posticis plicatis, ultimo amplo: apertura lata; labro acuto, serriculato; columellâ vix callosâ. Long. 22; diam. 12 millim. Inhabits Hong Kong Harbor. Kagosima. W. S.

Allied to *N. dispar* and *N. mutabilis*.

NASSA BEATA. *T. parva*, ovato-conica, solida, polita, grisea fulvido vittata, costis acutis ad 15 striâ subsuturali incis ornata, interspatiis concavis, anfractu ultimo ad dorsum simplici anticè striis 3-4 cincto: apertura parva angusta; labro incrassato intus profundè sulcato; columellâ callosâ, plicato-granulosâ. Axis 10; diam. 6 millim. Inhabits Loo Choo, in 18 fathoms, sandy. W. S.

Very near to *N. optata*, which has a beaded rather than a fluted surface; and the lip and pillar of the aperture are unarmed.

NASSA REPOSTA. T. solida, ovato-conica, rudis, cinerea, plicis inconspicuis 12-14 demum carentibus, et filis remotis (supernè 4) ornata; anfr. 7 convexis posticè sub-angulatis: apertura ampla rotundato-ovata; labro incrassato expanso intus denticulato; columellâ valdè arcuatâ luteâ, vitreâ; fauce fusco-rufâ posticè luteo-fasciatâ. Axis 12; diam. 7 millim. Inhabits Sydney, N. S. W.?

NASSA MUSTELINA. T. parva, elongata, ovato-conica, polita, livida maculis pallidis fusco marginatis variegata, ad anfractum ultimum posticè et anticè vittis pallidis (marginibus articulatis) et lineis binis medianis usque ad labrum acutum pallidum prolongatis cincta; anfr. 8 convexis elevatis: apertura ovata; labro acuto pallido intus polito; rostro pallido; columellâ arcuatâ porcellanâ; fauce lividâ vittis binis pallidis ornatâ. Axis 12; diam. 8 millim. Inhabits Ousima, off the coast, in 2 fathoms, coarse clean sand. W. S.

Allied to *N. zonalis*, but is much larger.

NASSA QUANTULA. T. parva, subtenuis, ovato-globosa, rufo-albida; anfr. 6 convexiusculis, plicis ad 12 et filis confertis volventibus quorum uno postmediano rufo ornatis: apertura ampla rotundato-ovata; labro extus incrassato. Axis 7; diam. 3 millim. Inhabits St. Simon's Bay. W. S.

NASSA OPTATA. T. subtenuis, ovato-conica, acuta, polita, albida demum ferrugineo variegata; anfr. 7 convexiusculis ad 12-plicatis, plicis ad anfr. ultimum tandem carentibus, striis volventibus 5 quorum prænaturali profundiore gemmulas efformante secantibus; suturâ profundâ: apertura latè ovalis; labro intus lævi, extus incrassato rufo variegato; columellâ admodum callosâ. Axis 10; diam. 6 millim. Inhabits Sydney Harbor. W. S.

Very closely resembles the figure of *N. Gaysi* of the Conch. Iconica, which, however, is believed to represent a larger and more ventricose shell than that of Kiener.

NASSA DERMESTINA. T. parva, elongato-ovata, posticè acuta, cinerea; anfr. 7 rotundatis 15-16 plicatis et filis ordinatim cinc-

tis; suturâ impressâ: apertura parva, rotundata; labro incrassato intus denticulis et sulcis instructo; columellâ excavatâ leviter plicatâ. Axis 8; diam. 4 millim. Inhabits Kikaia. W. S.

NASSA PLEBECULA. T. parva, solida, elongata, ovato-conica, albida; anfr. 8 suturâ profundâ sejunctis, plicis ad 16 ornatis plerumque ad anfr. ultimum carentibus, et filis nitidis rufescentibus ad 5 cinctis quorum uno majore: apertura parva, subrotunda; labro albo intus denticulato et sulcato, extus latè incrassato, fusco maculato; rostro abbreviato. Axis 15; diam. 7 millim. Inhabits Ousima. W. S.

More slender than *N. ambigua* and *incrassata*, but closely allied.

NASSA PEDICULINA. T. parvula, solida, ovato-conica, rudis, straminea, plicis ad 12 elevatis et filis rufescentibus 5 ad plicas dilatatis ornatis; anfr. 7 convexis, apicalibus simplicibus, ultimo anticè coarctato; suturâ profundâ: apertura subcircularis; labro obtuso, extus incrassato; columellâ callo erecto instructâ; sinu siphonali profundo. Axis 6; diam. 4 millim. Inhabits Hong Kong Harbor. W. S.

Most noticeable for its large folds, unfinished aspect, and constriction about the beak.

NASSA SPURCA. T. parva, acuta, ovato-conica, cinerascens vel rufescens lineâ spirali flavidâ cincta, plicis numerosis et filis supercurrentibus ubique cancellata; anfr. 7 ventricosus: apertura parva rotundata; labro extus incrassato, intus sulcato; columellâ arcuatâ, callo fuscescente sparsim granulato indutâ; fauce fusco vittatâ. Axis 10; diam. 6 millim. Inhabits St. Simon's Bay, in 12 fathoms, sandy. W. S.

The fine rasp-like surface and dusky aspect, with the single pale belt, distinguish it; somewhat like a small *N. trivittata*. This and the preceding belong to the subgen. *Tritia*, Adams.

MITRA JACULANDA. T. parva, symmetrica, fusiformis, cinereo-rubescens fusco dilutè nuberculata, sulcis longitudinalibus ferè continuis et lineis volventibus levioribus (8) anticis sensim remotioribus clathrata; anfr. 7 rotundatis, ultimo $\frac{3}{4}$ longitud. testæ adæquante; suturâ exili: apertura angusta; labro intus denticu-

lato; columellâ 4-plicatâ. Axis 8; diam. 2.5 millim. Inhabits China Seas. W. S.

Allied to *M. recurva*, Rv., but the sculpture is much more delicate.

MITRA SECALINA. T. minuta, fusiformis, obtusa, impolita, fulva; anfr. 6, apicalibus secundis, lævibus, ceteris striis exilibus longitudinalibus et transversis quadrulas efformantibus ubique ornatis; suturâ tabulatâ: apertura angusta, posticè quadrata; labro acuto, exiguè crenulato, intus denticulato; columellâ 3-plicatâ. Axis 6; diam. 3 millim. Inhabits Ousima. W. S.

MITRA RUSSA. T. parva, elongato-ovata, castanea vel aurantiaca, nitida, plicis ad 14 ad anfractum ultimum solum expositis, et striis exilibus ad interspatia ornata; anfr. 6 admodum convexis, apice mamillato, ultimo anticè instricto, et lineis volventibus cincto: apertura angustè lunata prorsum dilatans; labro acuto; columellâ 4-plicatâ. Axis 6; diam. 3 millim. Inhabits China Seas. W. S.

COLUMBELLA BALTEATA. T. minuta, rhomboidea, elongata, nitida, straminea vittâ fulvâ cincta; anfr. 7 tribus posticis simplicibus, ceteris lyratis et lineâ subsuturali impressis, interspatiis transversim striatis: apertura angustè lunata; labro simplici. Axis 4; lat. 2 millim. Inhabits China Seas.

The cutting of the folds by the subsutural line forms a circle of beads.

This and the following eight species belong to the subgen. *Anachis* H. & A. Adams.

COLUMBELLA (Anachis) NEBULOSA. T. parva, elongato-ovata, turrita, nitida dilutè flavida saturatiori variegata; anfr. 8 tabulatis convexiusculis lineâ suturali et undulis ad 20 ornatis, ultimo dimidiam longitud. testæ superante, posticè solum undulato, striis volventibus retrorsum decrescentibus insculpto: apertura trientem longitudinis testæ adæquans, lunata. Axis 6; lat. 25 millim. Inhabits China Seas. W. S.

COLUMBELLA (Anachis) DORSUOSA. T. parva, elongata, ovato-fusiformis, nitida, cerina, vittâ rufâ præsuturali, alterâ rostrum circumambiente variegata, plicis 7 et striis tenuibus trans-

versis ornata; anfr. 8 convexiusculis posticè abruptis: apertura lunata antrorsum angustata; labro acuto. Axis 7; lat. 3 millim. Inhabits Hong Kong. W. S.

COLUMBELLA (*Anachis*) *MINUTA*. T. minuta, ovata, turrita, straminea, plicis acutis (12) apud strias rostrum cingentes repentè terminantibus insculpta; anfr. 6 benè discretis: apertura trientem longitudinis testæ penè adæquans, satis lata; labro intus modicè gibboso. Axis 2.5; diam. 1 millim. Inhabits China Seas. W. S.

Allied to *C. parva*, Sowb., which is less slender, and has a brown sutural band.

COLUMBELLA (*Anachis*) *ZONATA*. T. minuta, fusiformis, nitida, cerina, vittâ subsuturali castaneâ et alterâ basali latiori cincta, plicis flexuosis 10-12 ornata; anfr. 6 posticè instrictis, ultimo ad rostrum elongatum subitò contracto: apertura angusta; columellâ valdè arcuatâ; labro acuto, simplici. Axis 3; diam. 2 millim. Inhabits Kagosima. W. S.

COLUMBELLA (*Anachis*) *FULMINEA*. T. parvula, ovato-lanceolata, nitida, castanea lineis angulatis flavidis variè dispositis, et plicis flexuosis demum disparentibus ornata; anfr. 6 convexis ultimo anticè striis cincto: apertura angusta, dimidiam longitudinis testæ vix adæquans, posticè rotundata; labro simplici posticè leviter incrassato, intus lævi; fauce purpurascente. Axis 7; diam. 3 millim. Inhabits St. Simon's Bay. W. S.

The folds are unusually distinct and prominent.

COLUMBELLA (*Anachis*) *ATRATA*. T. minuta, crassa, ovato-lanceolata, anthracina, anticè striis cincta; plicis acutis ad 12 anticè obsolescentibus; anfr. 6 tumidis, modicè tabulatis: apertura angusta posticè acuta; labro simplici posticè sinuoso, intus vix denticulato; fauce atratâ. Axis 5; diam. 2 millim. Inhabits Hong Kong Harbor. W. S.

COLUMBELLA (*Anachis*) *MINUSCULA*. T. minuta, crassa, elongata, acuminata, fusca; anfr. 7 convexiusculis vix discretis, plicis tenuibus rectis interdum anticè obsoletis clathrata: apertura perangusta, dimidiam longitud. testæ adæquans, posticè acuta; labro arcuato, acuto, simplici, intus granulato, columellâ arcuatâ,

callo modico indutâ. Axis 4; diam. 1.5 millim. Inhabits Ousima. W. S.

Though so small, its characters are well marked. A variety is thinner, horn-colored, with two dark revolving threads.

COLUMBELLA ALTERNATA. T. minuta, elongato-ovata, nitida, straminea maculis elongatis rufis interruptè vittata, ad anfractum ultimum duplicatis; anfr. 5, plicis ad 12 eminentibus obtusis et striis anticalibus volventibus ornatis: apertura curta, angusta; labro incrassato intus crenato. Axis 3; diam. 1.5 millim. Inhabits Hong Kong. W. S.

Sufficiently designated by its stripes of elongated spots arranged on alternate folds.

COLUMBELLA VIRGINEA. T. minuta, rhomboideo-fusiformis, lactea, plicis (14) et anticè striis paucis munita; anfr. 6 tabulatis et lineâ subsuturali insculptis, ultimo $\frac{3}{4}$ longitud. testæ adæquante antrorsum angustato et admodum recurvo: apertura perangusta, flexuosa; labro edentato; columellæ callo erecto. Axis 4; diam. 1 millim. Inhabits China Seas. W. S.

This small species has the principal characters of the genus *Pyrene*, Bolten.

COLUMBELLA BICINCTA. T. parva, ovata, turrita, tenuis, levis, cinerascens fulvo bicincta; anfr. 8 convexiusculis; suturâ impressâ: apertura lunata; labro arcuato, acuto intus denticulato; columellâ violaceâ, callo tenui, anticè tuberculato. Axis 10; diam. 4+ millim. Inhabits Hong Kong Harbor, 10 fathoms, shelly sand. W. S.

This species and the three succeeding belong to the genus *Amycla*, H. & A. Adams, more especially to the subgenus *Astyris*.

COLUMBELLA LINEOLATA. T. parva, ovato-lanceolata, crassa, polita, straminea filis 4 fulvis cincta (ad anfr. ult. 8); anfr. 8 convexis, apicalibus plicatulis, ultimo $\frac{3}{4}$ longitud. testæ adæquante anticè striis cincto: apertura lunata; labro tenui posticè sinuato, intus denticulato; callo columellari copioso; canali curto, lato. Axis 10; diam. 4 millim. Inhabits Hong Kong.

Very closely resembles *C. lactea*, Sowb.

COLUMBELLA DECOLOR. *T. parva, ovato-lanceolata, polita, straminea ferrugineo interdum maculata; anfr. 6+ convexis, apicalibus concinnè plicatis, ultimo anticè striato: apertura satis ampla; labro tenui anticè subitò incurvato intus denticulato; columella concava denticulo acuto posticè munità; canali curto, angusto. Axis 9; diam. 4 millim. Inhabits Loo Choo. W. S.*

COLUMBELLA ARANEOSA. *T. parva, ovato-lanceolata, levigata, fulva albido exiliter reticulata et hic illic maculata; anfr. 8 convexiusculis subtabulatis, apicalibus inornatis, ultimo subangulato anticè striato: apertura angusta, posticè rotundata; labro simplici, arcuato, violaceo tincto, intus denticulato; callo columellari copioso, everso, absque denticulo. Axis 10; diam. 4 millim. Inhabits Kagosima Bay and China Coast. W. S.*

Generally resembles *C. austrina*, Gask., except in color.

COLUMBELLA (Strombina) PUNGENS. *T. parva, lanceolata, polita, ex stramineo fulvescens antrorsum pallescens, plicis numerosis ornata; anfr. 10 conicis, ultimo gibboso subitò constricto ibi spiraliter striato; suturâ impressâ: apertura angusta; labro posticè sinuato, incrassato, antrorsum attenuato; columellæ callo in medio extruso, posticè sinuato; rostro longo, recurvo. Axis 10; diam. 4 millim. Inhabits Port Lloyd, Bonin Islands, common. W. S.*

A miniature representation of *C. angularis*, Sowb.

DRILLIA VALLATA. *T. parva, lanceolata, lurida; anfr. 10 posticè abruptis, quisque carinam marginalem et fila (1-2) intercurrentia gerens; interspatiis concinnè clathratis; anfr. ultimo subventricosus, filis ad 10 cincto, additis duobus minoribus in sinu terminantibus: apertura $\frac{1}{3}$ totius longitudinis, angusta; labro exstante, sinu lato, profundo; columellâ lævi; rostro brevi, lato. Axis 9; diam. 3 millim. Inhabits vicinity of Hong Kong, in 10 fathoms, shelly mud. W. S.*

Allied to *D. violacea*.

DRILLIA RECIPROCA. *T. parva, lanceolata, flavescens retrorsum lutescens et obscure stringata; anfr. 10 convexiusculis, 4-5 carinatis (ult. anfr. 10-12) carinâ medianâ eminentiore, interspatiis clathratis, clathris intervalli postici alteris contrariè obliquis: apertura $\frac{1}{4}$ totius longitudinis; labro valdè producto; sinu lato,*

profundo; rostro brevi, lato, contorto. Axis 12; diam. 4 millim. Inhabits Ousima. W. S.

Much like the preceding; but the color and relative size of carinæ are different.

DRILLIA EBOREA. T. parva, solida, lanceolata, ex eburneo lutescens, striis exilissimis transversis ubique insculpta; anfr. 8+ supernis plicatulis, ultimo $\frac{1}{2}$ totius longit. testæ: apertura lunata; labro simplici, crasso, anticè angulato; sinu crescentico; columellâ callo erecto munitâ; rostro brevi, reflexo; canali angusto ferè clauso.

Shell small, solid, lanceolate, yellowish white, everywhere densely and faintly grooved by transverse lines, most so near the sutures, apical whorls longitudinally folded; whorls 8+, the last quite half the length of the shell: aperture narrow, lunate, placed somewhat laterally; lip thick, simple, with a slight sinus near its posterior junction; pillar with a thick, erect callus, quite thick posteriorly; rostrum reflexed. Axis 14 millim.; diam. 4 millim. Inhabits Kikaia Island. W. S.

This is a singular species, in structure much like *Clavatula felina*, Hinds, but in its aperture and canal approaching to Klein's section *Epidromus* of the genus *Triton*.

BELA TURGIDA. T. parva, crassa, ovata, lactea, epidermide corneo fugaceo induta, sulcis numerosis (28) longitudinaliter arata, interspatiis duplo latoribus et striis confertis transversis insculptis; anfr. 6 curtis, ventricosis; suturâ profundâ: apertura ovata dimidiam totius longitudinis brevior; labro simplici arcuato; columellâ planulatâ, porcellanâ; rostro angusto, curto. Axis 10; diam. 5 millim. Inhabits Kamtschatka. W. S.

CLATHURELLA PEREGRINA. T. ovato-fusififormis, solida, obscurè fulva, plicis obtusis ad 18, filis transversis (ubi plicas decussantibus dilatatis) ornata; anfr. 6+ ventricosis: apertura $\frac{2}{3}$ totius longitudinis lunata, posticè rotundata; labro acuto intus lamellato; canali brevi, angusto abruptè incepto. Axis 12; diam. 5 millim. Inhabits Sydney Harbor.

Closely allied to *C. assimilis*, but less colored, and the striæ less crowded.

CLATHURELLA ASPERSA. T. parva, lanceolata, gracilis, cinerea ferrugineo-maculata, plicis 15-18 flexuosis filis ad 6 transeuntibus clathrata; anfr. 8 perobliquis, convexis posticè paullum constrictis, ultimo $\frac{1}{2}$ totius longitudinis antrorsum acuminato, plicis et filis omnino ornato: apertura lanceolata; labro incrassato, inflecto, intus lævi; sinu lato, profundo; rostro elongato. Axis 14; diam. 4 millim. Off Hong Kong, in 15 fathoms, shelly sand. W. S.

C. Guildingii, Rv. may be the same described from a small specimen.

CLATHURELLA FILOSA. T. ovata, turrita, tenuis, cinerea lineis rufis cincta, plicis flexuosis ad 16 suturam posticè haud attigentibus, et filis transversis 6 ad plicas dilatatis ornata; anfr. 10 ventricosi, tabulatis, ultimo anticè constricto: apertura latè lunata; labro admodum arcuato; sinu juxta suturam, haud profundo; columellâ nudâ. Axis 20; diam. 10 millim. Inhabits Ousima. W. S.

CLATHURELLA RUBICUNDA. T. minuta, crassa, ovato-turrita, dilutè rosacea filis pallidioribus lineâ saturatori divisis et vittâ subsuturali pallidiori ornata; anfr. 6+ ventricosi citò crescentibus, undulis 10 et filis transversis (ad anfr. penult. 6) clathratis: apertura curta, angusta; labro tumido intus denticulato; sinu angusto, profundo; columellâ flexuosâ; canali brevi. Axis 5; diam. 2 millim. Inhabits Loo Choo. W. S.

CLATHURELLA LACUNOSA. T. minuta, crassa, ovata, testacea, clathris et filis transversis eminentioribus cancellata, cancellis quadratis profundis; spira obtusa, anfr. 6 angulatis posticè excavatis: apertura dimidiam totius longitudinis, angustè lunata; labro incrassato intus lævi; sinu minimè profundo; columellâ flexuosâ. Axis 5; diam. 2.5 millim. Inhabits Hong Kong Harbor, in 10 fathoms, shelly bottom. W. S.

CLATHURELLA AMPLEXA. T. parva, fusiformis, albida fusco (ad anfractum ult.) fasciata, plicis acutis flexuosis ad 10 et striis numerosis confertis (quorum duæ juxta suturam majoribus) insculpta; anfr. 10 convexiusculis, declivibus, ultimo rhomboideo; suturâ profundâ, crenulatâ: apertura latè lunata; labro tenui; sinu lato, minimè profundo. Axis 9; diam. 3 millim. Inhabits Simon's Bay, in 12 fathoms, sandy bottom. W. S.

Possibly *C. lirata*, which it certainly resembles.

DAPHNELLA DELUTA. T. parva, tenuis, fusiformis, flavescens maculis ferrugineis zonata, striis elevatis exiguè reticulata, transversis aliquid majoribus; anfr. 7+ convexiusculis elongatis: apertura longa angusta posticè acuta; labro inflecto intus denticulato; sinu valdè profundo; canali brevi, lato; columellâ protractâ in medio tumidâ. Axis 20; diam. 5 millim. Inhabits China Seas. W. S.

CYTHARA LOTA. T. parva, ovato-rhomboidea, crassa, alba, plicis acutis ad 12 lyrata et striis profundis (præsuturali aliis majori) cincta; anfr. 4 spiram abbreviatam efformantibus, ultimo antrorsum declivi: apertura angusta, dimidiam totius longitudinis excedens; labro crasso, inflecto, intus dentato; sinu profundo; columellâ sulcis obliquis ad 7 insculptâ. Axis 5; diam. 3 millim. Inhabits China Seas. W. S.

CLAVATULA PUNGENS. T. parva, fusiformis, cinerea, plicis acutis ad 20 anticè evanescentibus et liris 10-12 (quorum post-suturali majori) plicas undulatim supereuntibus ornata; anfr. 7+ rotundatis, ultimo in rostrum gracilem desinente: apertura parva, pyriformis $\frac{1}{2}$ totius longitudinis testæ; labri sinu angusto, minimè profundo. Axis 9; diam. 3 millim. Inhabits Hong Kong Harbor, in 10 fathoms, shelly sand. W. S.

This shell has the aspect of *Clavatula*, and is very like to *C. debilis*, Hinds; but as the operculum principally characterizes that genus, the generic place must be uncertain.

MANGELIA PURA. T. parva, subgibbosa, fusiformis, lactea filis exillissimis confertis versus apicem subgranulatis cincta; anfr. 6+ convexiusculis, ultimo maximo rhomboideo, elongato; suturâ lineari: apertura angusta, ovalis; sinu profundo ferè clauso; labro simplici quadrato; canali recto; rostro sine constrictione. Axis 7; diam. 2 millim. Inhabits Hong Kong Harbor. W. S.

This might perhaps come under the genus *Cythara*.

MANGELIA INTAMINATA. T. parva, solida, fusiformis, corallina, plicis tenuibus acutis ad 12 lyrata, et filis ad 5 quorum mediani crassiori cincta; anfr. 6+ convexiusculis, ultimo rhomboideo, $\frac{1}{2}$ totius testæ superante, anticè constricto, filis 10 (quorum uno post constrictionem majori) cincto: apertura angusta; labro incrassato,

crenulato, anticè excurvato; sinu parvo. Axis 7; diam. 3 millim. Inhabits China Seas. W. S.

MANGELIA ALBICINCTA. T. minuta, elongata, ovato-turrita, dilutè rosacea, ad 11-undulata et filis ubique cincta (4 ad anfr. ultimum quorum tertio albo); anfr. 7 rotundatis, apicalibus inornatis: apertura angusta, sigmoidea; labro varicoso intus 4-denticulato; sinu angusto, minimè profundo; rostro brevi. Axis 4; diam. 2 millim. Inhabits Loo Choo Seas. W. S.

MANGELIA GLAREOSA. T. minuta, rhomboidea, turrita, crassa, calcarea, plicis elevatis ad 12 et liris transversis ordinatis quicquid minoribus ornata, inde granulata; anfr. 5+ tabulatis: apertura angusta, posticè acuminata, $\frac{1}{2}$ totius longitudinis vix brevior; labro crasso, crenulato; sinu minimè profundo. Axis 5; diam. 2 millim. Inhabits Hong Kong Harbor, in 10 fathoms, shelly bottom. W. S.

MANGELIA LUTEA. T. minuta, acicularis, aurantiaca, plicis 8 conspicuis posticè suturam haud attigentibus, et striis minimè impressis ad interspatia ornata; anfr. 7 planulatis posticè tabulatis, apicalibus inornatis, ultimo rhomboideo $\frac{1}{2}$ totius longitudinis adæquante: apertura angustè ovalis; labro simplici, incrassato, quadrato; sinu lato, brevissimo. Axis 5; diam. 2— millim. Inhabits Loo Choo Seas. W. S.

MANGELIA DEMPSTA. T. minuta, brevis, rhomboideo-fusifor-
mis, lactea, plicis conspicuis ad 8, et filis volventibus crassis ornata; anfr. 6 castellatis posticè angulatis, ultimo $\frac{1}{2}$ totius longitudinis æquante: apertura linearis; labro acuto posticè incrassato; sinu brevi, lato. Axis 3; diam. 1 millim. Inhabits China Seas. W. S.

Remarkable for its elongated rhomboidal form and coarse sculpture.

The Corresponding Secretary read the following list of letters recently received, viz.: —

From the K. K. Akademie der Wissenschaften, Wien, February 24, 1859; Verein für Naturkunde, Wiesbaden, December 23, 1859, acknowledging the receipt of the Society's publications; Société de Physique, &c., de Genève, November 5, 1859; Lin-

næan Society, London, May 5, 1859, acknowledging the same, and presenting their own publications; Verein für Naturkunde, Wiesbaden, December 23, 1859; K. K. Akademie, Wien, December 17 and July 7, 1859; Académie Royale, &c., Stockholm, November 25, 1859, presenting various publications; Joseph Hyrtl, Vienna, May 4, 1860, acknowledging his election as Honorary Member; and Jules Marcou, Salins, May 23, acknowledging his election as Corresponding Member.

Mr. F. W. Lincoln, Jr., of Boston, was elected a Resident Member.

DONATIONS TO THE MUSEUM.

April 4, 1860. Two specimens of *Gobio fluviatilis*, and one each of *Phoxinus varius*, *Leuciscus rodens*, *L. prazinus*, *L. dobula*, *Tinca chrysiithys*, *Perca fluviatilis*, *Esox lucius*, and *Coregonus marenula*, from Lake Neufchatel; and *Salmo fario* from the rivers of Switzerland; by the Museum of Comparative Zoölogy, Cambridge. An extensive collection of fishes, crustaceans, mollusks, and radiates, from Maui, Sandwich Islands; by Dr. C. F. Winslow. Skeletons of male gray wolf from Wisconsin; of male and female cross fox, and of porcupine, from Portage Lake, Michigan; by Dr. S. Kneeland, Jr. Canada lynx, entire specimen; by Mr. John Sears. Specimens of *Astacus* from Lake Neufchatel; by the Museum of Comparative Zoölogy, Cambridge. West Indian crocodile (*Crocodilus acutus*, Geoffr.); by Dr. J. N. Borland.

April 18. Skull of an Indian from Fox River, Appleton, Wisconsin; by Dr. M. Tompkins. A lump fish (*Cyclopterus lumpus*) from Holmes Hole; by Dr. D. H. Storer. A red-bellied terrapin (*Emys rubriventris*) from Virginia; by Mr. J. A. Cutting.

May 2. 160 of the grasses of the northern United States; by Mr. C. J. Sprague. An agouti, wolf fish, and iguana; by Mr. J. A. Cutting.

May 16. Florida rat, embryos of egret, tracheæ of birds, brain of turkey-buzzard, fractured jaw of *Ursus Americanus*, from Florida; by Dr. H. Bryant. Skins of California squirrel (*Sciurus fessor*) and prairie squirrel (*Cynomys Ludovicianus*); by the Smithsonian Institution. Two human brains; by Dr. C. Ellis. Skulls of monkey (*Cercopithecus*) from Africa, and of skunk (*Mephitis mephitica*); by Mr. W. B. Gibson. Several fishes, crustaceans of the genera *Cambarus*, *Gelasimus*, and *Chlorodiæus*, two myriapods, and the pupa of a dragon-fly, from Florida; by Dr. H. Bryant. A living horned lizard (*Phrynosoma*) from Texas; by Mr. H. J. Doniphan. Specimen of shale with adhering coal from the Albert mine, New Brunswick; by Prof. W. B. Rogers.

June 6. Horns of the hartebeest (*Boselaphus caama*, Gray) from Africa; by C. J. Sprague. Skulls of a female deer (*Cervus Virginianus*), fox (*Vulpes fulvus*), and great white heron (*Ardea occidentalis*), land and fresh-water shells,

and a living ophisaurian reptile, from Florida; by Dr. H. Bryant. Skeleton of a monkey (*Semnopithecus*); by W. B. Gibson. Egg of the New Holland emu; by Dr. S. Durkee. Cysticercus form of the *Tania crassicolis*, in the liver of a rat; by D. Mack. A white, living *Gordius*, from S. Natick, Mass.; by W. Edwards.

June 20. A young seal; by S. N. Chamberlain. Fœtal dog-fish; by D. Mack. Star-nosed mole from Massachusetts; by A. Durant.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1860.

J. J. Anthony. Descriptions of new species of American Fluviatile Gasteropods. 8vo. Pamph. *From the Author.*

W. Stimpson. Prodrromus descriptionis Animalium evertebratorum, &c. Pars VIII. *From the Author.*

Twelfth Annual Report of the Regents of the University of New York. 8vo. Pamph. Albany. *From the Regents.*

H. Wagner. Cryptogamen — Juncaceæ, Cyperaceæ, Gramineæ. 12mo. Bielefeld, 1854. *From S. Urbino.*

Nettle, R. Salmon Fisheries of the St. Lawrence. 12mo. Montreal. *From the Author.*

Institutes of Medicine. By Martyn Paine, LL. D., M. D. 8vo. New York, 1859. *From the Author.*

Griffith, J. W., and Henfrey, H. Micrographic Dictionary. 8vo. London, 1856. *From Dr. S. Durkee.*

Forty-second Annual Report of the Trustees of the New York State Library. 8vo. Pamph. Albany, 1860. *From the Trustees.*

Beiträge zu der Insekten Geschichte herausgegeben. Von Ludwig Gottl. Scriba. Parts 1, 2, 3. 4to. Frankfurt, 1790-93.

Kennzeichen der Insekten. Von J. H. Sulzer. 4to. Zurich, 1761. *From Dr. Algermon Coolidge.*

Sketches of Washoe Silver Mines. By H. Degroot. 8vo. Pamph. San Francisco, 1860.

Review of Darwin on the Origin of Species. By John Amory Lowell. 8vo. Pamph. Boston, 1860. *From C. K. Dillaway.*

J. Jonstonus. History of the Wonderful Things of Nature. 8vo. London, 1657. *From Dr. C. T. Jackson.*

Dr. Jeffries. Narrative of two Aërial Voyages of Dr. Jeffries with Mons. Blanchard. 4to. London, 1788. *From Dr. B. J. Jeffries.*

Vegetable Structures in Coal. By J. W. Dawson, LL. D. 8vo. Pamph. London, 1860.

Silurian and Devonian Rocks of Nova Scotia. By J. W. Dawson, LL. D., &c. 8vo. Pamph. *From the Author.*

Durand, E. Biographical Notice of the late Thomas Nuttall. 8vo. Pamph. Sketch of the Botany of the basin of the Great Salt Lake of Utah. 4to Pamph. *From the Author.*

L. R. Gibbes. Botany of Edings's Bay. Description of *Ranilia muricata*. On a convenient form of Aspirator. Past and Present Condition of Niagara Falls. 8vo. Pamph. 1860.

Rules for accentuation of names in Natural History. By the same. 4to. Pamph. *From the Author.*

Denkschriften der K. K. Akademie der Wissenschaften. Math.-Naturw. Classe. Sechszehn. Band. 4to.

Sitzungsberichte der K. K. Akademie der Wissenschaften. Math.-Natur. Classe. Band XXXIII., No. 27-29, XXXIV.-VII., No. 1-20. 8vo.

Sitzungsberichte Math.-Naturw. 1858. No. 27-29. 1859. No. 1-9.

Proceedings of the Royal Geographical Society of London. Vol. IV. No. 1. 8vo.

Memoirs of the Geological Society of India. Vol. 1. Part 3. 8vo. Pamph.

Annual Report of the Superintendent of the Geological Survey of India. 8vo. Pamph. Calcutta, 1858-9.

Jahrbucher des Vereins für Naturkunde. Dreizehntes Heft. 8vo. Wiesbaden, 1858.

Canadian Journal of Industry, &c. No. 29, for May, 1860. Toronto.

Kongliga Svenska Fregatten Eugenie, &c. Zoologi III. 4to.

Mémoires de la Société de Physique et d'Histoire Naturelle de Genève. 4to. Tome XV. Première Part. Genève.

Journal of the Proceedings of the Linnæan Society of London. 8vo. Vol. II., Nos. 7, 8, III., 9-15. Supplement, Nos. 1, 2, (Botany.) Also II., 7, 8, III., 9-15, (Zoölogy.) List of Members for 1858-9. 8vo. Pamph. Addresses by T. Bell, F. R. S. 8vo. Pamph.

Transactions of the Linnæan Society of London. Vol. XXII. Parts 3, 4.

Jahrbücher der K. K. Central-Anstalt für Meteorologie und Erdmagnetismus. Von Karl Kreil. VI. Band. Jahr. 1854. 4to. Wien.

Archiv für Naturgeschichte. 3, 4. 1859.

Mémoires de la Société Royale des Sciences de Liège. Tome 14.

Entomologische Zeitung. 6 Vols. 8vo. Stettin, 1854-9.

Catalogus Coleopterorum Europæ. 12mo. Pamph. Stettin, 1859.

Catalogus Hemipterorum. 12mo. Pamph. Stettin, 1859.

Jahrbuch der K. K. Geologischen Reichsanstalt. 1859. X. Jahrgang. No. 2. April, May, June. 8vo. Wien.

Ausprache gehalten an Schlusse des ersten Decenniums der K. K. Geologischen Reichsanstalt. Von W. Haidinger. 8vo. Pamph. Wien, 1859.

Kongliga Svenska Vetenskaps-Akad. Handlingar. Ny Följd Andra Bandet. Första Häftet. 1867. 4to.

Öfversigt af Kong. Vetenskaps-Akad. Förhandlingar. 8vo. Femtonde Argängen. 1858.

Gelehrte Anzeigen. Vols. 47, 48. 4to. München, 1858-9.

Dr. C. F. P. von Martius. Eine Rede zur Feier des Akad. Sæcularfestes. 4to. Pamph. München, 1859.

L. Seidel. Untersuchungen über die Lichtstärke der Planeten Venus, Mars, Jupiter, und Saturn. Nebst einem Anhang enthaltend die Theorie der Lichterscheinung des Saturn.

- Wurt. Naturwissenschaftliche Jahreshfte. 1. 1860. 8vo. Stuttgart.
 Special Meeting of the American Geographical and Statistical Society. 8vo. Pamph. New York, 1860.
- Silliman's American Journal of Science and Arts. Vol. XXIX. No. 87, for May, 1860.
- Mémoires de l'Académie Impériale des Sciences, &c., de Dijon. Deuxième Série. Tome VII. 8vo. 1859.
- Actes de l'Académie Impériale des Sciences, &c., de Bordeaux. 8vo. Pamph. Vingt-unième année. 2e Trimestre. Paris, 1859.
- Malakozoologische Blätter. 5 Nos. 8vo. Pamph.
- Pfeiffer, L., Dr. Monographia Heliceorum viventium. Vol. IV. Lipsiæ, 1859.
- Proceedings of the Zoölogical Society of London. With Illustrations. 8vo. 1859.
- American Geology. By Eben. Emmons. Part 1. 8vo. Albany, 1854.
- Transactions of the American Philosophical Society. Vol. XI. Part 3. 4to. Philadelphia, 1860.
- Proceedings of the same. Vol. VII. No. 63. 8vo. Pamph.
- Laws, List of Members, &c., of the same. 8vo. Pamph.
- Proceedings of the American Antiquarian Society. 8vo. Pamph. June, 1860. Boston.
- American Medical Times. 4to. No. 1, Vol. 1. New York.
- Proceedings of the Academy of Natural Sciences at Philadelphia. Sigs. 6-12. 8vo.
- Canadian Naturalist and Geologist, for April, 1860. Vol. V. No. 2.
- Journal of the Geological Society of Dublin. Vol. VIII. Part 2. 1859.
- New York Journal of Medicine. No. 102, for May, 1860. *Received in Exchange.*
- Annals and Magazine of Natural History. Vol. V. Nos. 27, 28, and 29, for March, April, and May, 1860.
- Quarterly Journal of the Geological Society. Vol. XVI. Part 2. London. *From the Courtis Fund.*
- Diary of the American Revolution. By Frank Moore. 8vo. New York, 1860.
- James Savage. Genealogical Dictionary of the First Settlers of New England. Vols. 1 and 2. 8vo. Boston.
- History of the Republic of the United States of America. By John C. Hamilton. Vols. 3, 4, 5, 6. 8vo. New York, 1859.
- History of the United States. By George Bancroft. Vol. VIII. Boston, 1860. *Deposited by the Republican Institution.*

September 5, 1860.

The President in the Chair.

Dr. A. A. Hayes, on presenting a "Report on Supplying the City of Charlestown, Mass., with Pure Water," made some additional observations on the analyses of the water, and on the phenomena connected with the tides at Mystic Pond.

Mr. Temple Prime, of New York, presented a paper entitled :

SYNONYMY OF THE SPECIES OF CYRENELLA, A GENUS OF MOLLUSCA BELONGING TO THE FAMILY OF THE LUCINIDÆ. BY TEMPLE PRIME.

CYRENELLA, Deshayes.

VENUS, Desh. Coq. Foss. Par. 1824. CYRENELLA, Desh. Soc. Philom. 1833. CYRENOIDA, Joannis. Mag. Zoöl. 1835. CYRENELLA, Desh. Loc. sup. cit. 1835. CYCLAS. Fer. Cat. 20, 1837. CYRENOIDES, Morelet. Test. Cub. 1851.

1. CYRENELLA ALATA, Adams.

Cyrenoida alata, Adams and Reeve. Voy. Samarang, 80, pl. xxiv. f. 12, 1850. Hab. Corean Archipelago.

2. CYRENELLA AMERICANA, Morelet.

Cyrenoides Americanus, Morelet. Test. Nov. Cub. pt. 2d, 26, 1851. Hab. Central America.

3. CYRENELLA COREËNSIS, Adams.

Cyrenoida Coreënsis, Adams and Reeve. Voy. Samarang, 80, pl. xxiv. f. 14, 1850. Hab. Corean Archipelago.

4. CYRENELLA CUMINGI, Sowerby.

Cyrenoida Cumingi, Sowb. Hanl. Wood's suppl. Cat. pl. xv. f. 5, 1854. Hab. Philippines.

5. CYRENELLA DUPONTIA, Joannis. Desh. Mag. Zoöl., class.
v. 70, 1835.

Cyrenoida Dupontia, Joannis. Loc. sup. cit. class. v. pl. 64,
f. 1-3, 1835.

Cyclas Dupontia, Ferussac. Cat. 20, 1837. Hab. Senegal.

6. CYRENELLA LENTICULARIS, Desh. Proc. Zoöl. Soc. xxii.
341, 1854.

Cyrenoida lenticularis, Adams. Rec. Gen. ii. 452, 1858.
Hab. ?

7. CYRENELLA LUCINOIDES, Desh. Trait. elem. Conch. ii.
818, pl. xiv. bis f. 10-12, 1853.

Venus lucinoides, Desh. Desh. Coq. Foss. Par. 1, 146, pl.
xxiii. f. 12, 13, 1824. Hab. France, (fossil.)

8. CYRENELLA MORETONENSIS, Desh. Proc. Zoöl. Soc. xxii.
341, 1854. Hab. Moreton Bay, Australia.

9. CYRENELLA OBLONGA, Sowerby. Proc. Zoöl. Soc. xxii.
341, 1854.

Cyrenoida oblonga, Sowb. Hanl. Wood. suppl. Cat. pl. xv. f.
6, 1854. Hab. Philippines.

10. CYRENELLA PHILIPPINARUM, Sowb. Proc. Zoöl. Soc.
xxii. 340, 1854. Hab. Philippines.

11. CYRENELLA PISIFORMIS, Desh. Proc. Zoöl. Soc. xxii.
341, 1854. Hab. Philippines.

12. CYRENELLA SENEGALENSIS, Desh. Proc. Zoöl. Soc. xxii.
341, 1854.

Cyrenoida Senegalensis, Desh. Adams, Rec. Gen. ii. 452, 1858.
Hab. Senegal.

13. CYRENELLA SPHERICULA, Desh. Proc. Zoöl. Soc. xxii.
340, 1854. Hab. Moreton Bay, Australia.

14. CYRENELLA TUMIDA ?

Mysia tumida, Nutt.*Cyrenoida tumida*. Jay's Cat. iv. ed. 33, 1850. Hab. ?

Mr. Temple Prime presented also the following paper :

SYNONYMY OF THE KNOWN SPECIES OF RANGIA, A GENUS OF
THE FAMILY MACTRACEA.

RANGIA, Desmoulins.

CLATHRODON, Gray, MSS. RANGIA, Desmoul. Soc. Linn. Bord. v. 1831. Conrad, Marine Conch. 1831. CLATHRODON, Gray. Conrad, Amer. II. xxiii. 1833. MACTRA. Conrad, Amer. II. xxiii. 1833. GNATHODON. Rang. Ann. Mus. n. ser. iii. 1834. Gray, London Mag. N. Hist. n. ser. i. 1837.

1. RANGIA CYRENOIDES, Desm. Act. Soc. Linn. Bord. v. 48, pl. 1, 1831. Conrad, Marine Conch. 57, pl. 13, 1831. Adams, Rec. Gen. ii. 380, 1858. Conrad, Proc. Ac. N. S. Phil. 232, 1860.

Clathrodon cuneata, Gray. Conrad, Amer. II. xxiii. 340, 1833.

Gnathodon cuneatus, Gray. Lond. Mag. N. Hist. n. ser. i. 77, f. 34, 1837. Hab. N. America.

2. RANGIA CLATHRODONTA, Conrad. Proc. Ac. N. S. Phil. 232, 1860.

Maetra clathrodonta, Conrad. Amer. II. xxiii. 340, 1833.

Gnathodon Grayi, Conrad. Foss. Test. form. 23, pl. 13, f. 1. Hab. N. America (fossil.)

3. RANGIA FLEXUOSA, Conrad. Proc. Ac. N. S. Phil. 232, 1860.

Gnathodon flexuosa, Conrad. Amer. II. xxxviii. 92, 1840. Hab. N. America.

Rangia Grayi, Conrad. Foss. Test. form. 23, pl. 13, f. 1, is *Rangia clathrodonta*, Conrad.

4. RANGIA LECONTEI, Conrad. Proc. Ac. N. S. Phil. 232, 1860.
Gnathodon Lecontei, Conrad. Il. Ac. N. S. Phil. 1853.
 Hab. N. America.
5. RANGIA MENDICA, Gould. Conrad, Proc. Ac. N. S. Phil.
 232, 1860.
Maetra mendica, Gould. Proc. Bost. Soc. N. H. iv. 88, 1851.
Gnathodon trigonum, Petit. Il. Conch. iv. 84, 1853.
Gnathodon mendica, Gould. Proc. Zool. xxiv. 200, 1856.
Rangia trigona, Petit. Adams, Rec. Gen. ii. 380, 1858. Hab.
 N. America.
6. RANGIA MINOR, Conrad. Proc. Ac. N. S. Phil. 232, 1860.
Gnathodon minor, Conrad. Foss. Test. form. 69, pl. 39, f. 6.
 Hab. N. America.
7. RANGIA PARVA, Petit. Adams, Rec. Gen. ii. 380, 1858.
 Conrad, Proc. Ac. N. S. Phil. 232, 1860.
Gnathodon parvum, Petit. Il. Conch. iv. 358, pl. 13, f. 9, 10,
 1853. Hab. New Holland.
8. RANGIA ROSTRATA, Petit. Adams, Rec. Gen. ii. 380, 1858.
Gnathodon rostratum, Petit. Il. Conch. iv. 84, 1853.
Rangia flexuosa, Conrad. Proc. Ac. N. S. Phil. 232, 1860.
 Hab. N. America.
Rangia trigona, Petit. Adams, Rec. Gen. ii. 380, 1858, is *Ran-*
gia mendica, Gould.

While preparing this paper, there appeared in the June number of the Proceedings of the Academy of Natural Sciences of Philadelphia Mr. Conrad's Synopsis of the genus *Rangia*. It will be seen, however, that the views here taken are not always the same as those of Mr. Conrad.

Dr. A. A. Hayes exhibited a very fusible white mineral from Lake Superior, containing boracic acid; it was a silicate and borate of lime, and was obtained from the region of the Minnesota copper mine.

Dr. Kneeland observed that the same substance is abundant in the Portage Lake region, and exhibited from the Cabinet of the Society a large specimen obtained by him from the Isle Royale Mine.

A letter from Dr. W. H. Myers, of Fort Wayne, Ind., proposing to exchange shells for the Society's Proceedings, was referred to the Curator of Conchology and the Committee on Publications.

Dr. Kneeland presented a small framed engraving of J. J. Audubon, as he appeared in the later years of his life.

Mr. Paul B. Du Chaillu was elected a Corresponding Member; and Messrs. Nathaniel L. Hooper and J. H. Woodbury, of Boston, Resident Members.

September 19, 1860.

The President in the Chair.

Dr. Henry Bryant gave an account of a recent visit to the coast of Labrador.

He found Brünnich's guillemot (*Uria Brünnichii*, Sab.) and the bridled guillemot (*Uria marmorata*, Lath.) breeding abundantly on Gannet Rock, a locality considerably farther south than they have been generally supposed to breed.

Dr. C. T. Jackson gave an account of a visit to some old mines in the vicinity of Franconia, N. H., which had been recently reöpened, viz.: the Franconia iron mine, one of rich argentiferous galena at Warren, and a copper mine at Bath.

Dr. Jackson announced that he had discovered anda-

lusite made in an altered argillaceous slate, in place, on the road recently made on the side of Mt. Washington.

At Boar's Head, near Rye, N. H., are boulders containing this, which must have come from this locality on the easterly side of the mountains. It is interesting to be able to add another to the few localities in the United States where these beautiful crystals are found.

Dr. White exhibited the fungous growth commonly called California beer seed undergoing its development in a solution of molasses and water; much carbonic acid is evolved from this, and an excellent beer may be made from it if properly flavored.

The growth is very rapid, and consists of the spores of a fungus, somewhat resembling, though they are larger and rounder, those of the yeast plant (*Torula*). The spores, by their aggregation, form masses of the size and shape of popped corn. It is said to grow upon a tree in California.

The President exhibited a fossil from the southwest frontier of the United States.

The matrix was calcareous, and imbedded in it was a portion of the skull of the Capybara, the largest of the rodents, now confined to South America. Its principal interest consisted in its showing the narrowing down of the geographical distribution of this species, as the animal has never been found living in North America nor in the vicinity of the Isthmus in South America.

Messrs. William N. Eayrs and John McKay, of Boston, and William Ellery Copeland, of Roxbury, were chosen Resident Members.

DONATIONS TO THE MUSEUM.

September 5, 1860. An African monkey (*Colobus satanas*) and a sacred ibis; by Paul B. Du Chaillu. A South American boa; by Wm. A. Lerow. A green snake (*Coluber vernalis*) from the White Mountains; by S. D. Crane. An echinus (*Encope subclausa*) from the head of the Gulf of California; by Lieut. C. H. B. Caldwell, U. S. N. Three injected bull-frogs; by E. Samuels. Three centipedes and a large scorpion from Singapore, an echinus from the Cape of Good Hope, portions of the spines of the halibut and blue-fish, and a large beetle from

Brookline; by Dr. S. Kneeland, Jr. A Florida lobster and two European goldfinches; by James A. Cutting. A mud eel (*Siren lacertina*); by Dr. A. S. Baldwin, of Jacksonville, Fla. A paper-like web, said to have been made by a fig worm; by Miss Lydia B. Felt.

September 19. A complete skeleton of a young seal (*Phoca vitulina*) and a skull of the same, 7 skulls of the harp seal (*P. Grœnlandica*), the skull of a larger species of seal, 4 teeth of the killer (grampus), some univalve shells (*Buccinum*), and rocks containing fossils, all from Labrador; by Dr. Henry Bryant. A young snake, and an egg containing an embryo snake (probably of the black snake), from Scituate; by Dr. John Bacon. A large boa constrictor and 2 pipe fishes (*Syngnathus*); by James A. Cutting.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPT. 30, 1860.

Catalogue of Lepidopterous Insects at East India House. By Thomas Horsfield, F. R. S., &c., and Fred. Moore. 8vo. Vol. 2. London, 1858-9. *From the Secretary of State of India.*

Bulletin of the Wisconsin Agricultural and Mechanic Association. 8vo. Pamph. Vol. 1. pp. 1-16. 1860. *From I. A. Lapham, Secretary.*

New Orleans Medical and Surgical Journal. Sept. 1860. 8vo. Pamph. pp. 609-624. *From Dr. B. Dowler.*

Proceedings of the American Association for the Advancement of Science. 18th meeting. 8vo. Cambridge, 1860. *From the Association.*

Edinburgh New Philosophical Journal. Nos. 21, 22. New series. (Vol. XI. Nos. 1, 2.) *From Prof. H. D. Rogers.*

Report of the Commissioner of Patents for 1859. Agriculture. 8vo. Washington. *From the Commissioner.*

A. Kölliker. Ueber die Beziehungen der Chorda dorsalis zur Bildung der Wirbel der Selachier und einiger andern Fische. 8vo. Pamph. Würzburg, 1860. *From the Author.*

Annual of Scientific Discovery for 1850, 1851. 2 vols. 12mo. *From Dr. Samuel A. Green.*

The same for 1859. Boston. *From Dr. A. A. Gould.*

Mining Magazine. Edited by Wm. P. Blake. Vol. 1. Nos. 1 to 6. Nov. 1859 to July, 1860. New Haven. *From the Editor.*

Catalogue of Phœnogamous and Filicoid Plants. By Edward Tatnall. 8vo. Pamph. Wilmington, Del., 1860. *From the Author.*

Report on Supplying the City of Charlestown with Pure Water. By G. R. Baldwin and C. L. Stevenson. 8vo. Pamph. Boston, 1860. *From Dr. A. A. Hayes.*

Engraved portrait of John J. Audubon. *From Dr. S. Kneeland, Jr.*

Check list of the Shells of North America. Terrestrial Gasteropoda. By W. G. Binney. 8vo. Pamph.

Catalogue of the Terrestrial and Fluvial Gasteropods inhabiting North America. By W. G. Binney. 8vo. Pamph. *From the Author.*

J. Watts de Peyster. Life of Leonard Torstenson. 8vo. Poughkeepsie, 1856.

- History of Carausius, &c. 8vo. 1858.
 The Eclaircur, A Military Journal. Vols. 1, 2, 3. 8vo. 1858-55.
 The Dutch at the North Pole and the Dutch in Maine. 8vo. Pamph.
 The Dutch Battle of the Baltic. 8vo. Pamph.
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October 3, 1860.

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

Prof. Edward Hitchcock, of Amherst, made a communication on the conglomerate of Vermont, which contains elongated, flattened, and curved pebbles of quartzose nature, and sometimes of pure hyaline quartz; this subject had been formerly presented to the Society by his son (see meeting of Jan. 4, 1860.)

His observations had been made at Newport, where these distorted pebbles were first noticed, and at Wallingford and Plymouth, Vt., in the Green Mountains. He exhibited diagrams, showing the size, shape, and relation of these pebbles to the conglomerate enclosing them, and the gradual passage of the rounded and water-worn masses into the folia of the schists. At Newport the greatest elongation is in the direction of the strike, but in Vermont in the direction of the dip; in Plymouth he had found the pebbles of one surface continuous with the schistose laminæ of another. In some localities this quartzose conglomerate is intimately associated with gneiss, and seemingly a variety of it; he had no direct proof of this, but believed that there is a continuous series of changes from these quartzose elongated pebbles, through the talcose and micaceous schists, to the gneiss, — that all are varieties of the same rock. The gneiss of the Green Mountains has these conglomerates and schists on the east and west sides, the former being the uppermost. He drew a section of the mountains from Wallingford to Plymouth, embracing an extent of surface of about eleven miles, where these rocks occupy similar positions on each flank; according to appearances here presented, the dip of the strata indicates an immense amount of denudation.

He adhered to the opinion that these pebbles have been bent since their deposition, and while they were in a plastic state; they are not only elongated, but indented and curved around each other in some localities; the simple curvature of the strata might explain the elongation in the line of strike, but not the other phenomena presented. Some of these pebbles in Vermont are pure quartz.

To explain this he invoked the aid of chemistry, and the well-known action of hot water containing alkalis in solution in softening and decomposing silicates, extracting some ingredients and combining others, the form of the rock remaining unchanged.

Prof. Hitchcock exhibited some very distinct specimens of graptolite, a coralline fossil, from the rocks of Vermont.

Dr. C. T. Jackson expressed the same opinion as on a former occasion, that the pebbles found at Newport and in this State, as at Roxbury, were formed mechanically by being rolled upon beaches by the surf; even the distortions and indentations might be accounted for in this way, their parallels being now in process of formation on the beaches of this State and of Maine. But in regard to these Vermont pebbles, he believed that they might have been formed from the rock, but not the rock from the pebbles as Prof. Hitchcock maintains. In support of this view, he referred to the experiments of M. Daubrée, showing how silicates become soluble under moderately hot water in presence of alkalis, the quartz being separated and crystallized. In contrast with the immense denudation which has taken place in the North, he mentioned that in some places at the South, as at Dahlonega, Ga., the rocks are so decomposed and soft as to allow of being shovelled to a depth of 80 to 100 feet, none of the surface having been subjected to drift or denuding agencies.

Dr. A. A. Hayes, in reference to the mineral from Lake Superior containing boracic acid, mentioned at the first September meeting, observed that it presented two points of special interest: one is that, though very compact, it shows the composition of datholite better than the crystalline form of this substance; the other is its economical value; as it contains $22\frac{1}{2}$ per cent. of boracic acid, if abundant, it might be collected with commercial advantage.

In reply to a question of Mr. Kidder in relation to the animals which eat the piles in Boston Harbor, Dr. A. A. Gould replied that, though popularly called worms, they are minute crustaceans, the *Limnoria terebrans*; they are about $\frac{3}{20}$ of an inch long.

The Treasurer reported that the note to the Corresponding Secretary read at the last meeting was intended as a notice of the bequest of Mr. Phillips, and that the Executors were waiting the action of the Society.

It was, therefore, voted "that the Society accept the bequest of the late Hon. Jonathan Phillips."

It was also voted "that the Treasurer be authorized to receive the amount in behalf of the Society, and to give to the Executors of his estate a satisfactory discharge for the same."

Dr. Christopher Johnston, of Baltimore, Md., was elected a Corresponding Member, and H. P. Binney, of Boston, a Resident Member.

October 17, 1860.

The President in the Chair.

A letter was read from Mr. H. D. Thoreau, of Concord, Mass., in reference to a Canada lynx (*Lynx Canadensis*) killed in Carlisle, Mass., Sept. 9, 1860.

This animal was a female, as large as any of its kind described, and had *naked* soles. Audubon and Bachman, in the *Quadrupeds of North America*, and Emmons, in the *Massachusetts Reports*, give *hairiness* of the soles as a specific character of the Canada lynx, as distinguishing it from the bay lynx (*L. rufus*), which has *naked* soles. Baird, in his *Report on the Mammals of North America*, mentions having received a specimen of the Canada lynx in summer pelage, in which the pads of the feet were distinctly visible, not being overgrown as in winter specimens. It appears from these specimens that *hairiness* of the soles is not a specific character in the Canada lynx. In Mr. Thoreau's animal there is a distinct black line commencing at the eye and terminating in the black portion of the ruff; he believes that some of the

specimens killed in this vicinity of late years, and called bay lynx, were the Canada lynx.

Mr. S. H. Scudder gave an account of a recent visit to Lake Winnipeg and the Saskatchewan River, having ascended the latter about one hundred and fifty miles.

Near Red River, not far from Dayton, Minn., the limit between the rolling and the level prairie is very abrupt; this river is very crooked, with a general current of $1\frac{1}{2}$ miles an hour, and with occasional rapids; the streams opening into it, though small, all have names, being important on account of the growth of timber which is found along the banks, even of the smallest, and nowhere else. The navigation is not impeded by fallen trees, as they stand back 40 to 60 feet from the water; they are principally aspen, oak, and elm; the reason of this position of the trees is that the river flows to the north, and the ice breaks up soonest at the source; the ice not being floated down by the current below forms high dams which go along slowly, grinding down all the trees on the sides of the stream within the reach of high water; there is a level prairie on each side.

The west shore of Lake Winnipeg is a sandy beach, 20 to 30 yards wide, and beyond this is a vast marsh of tamarack and spruce; the eastern shore is granitic, rising into low mounds covered with trees, the western being limestone with some sandstone; in some places are large collections of rounded stones, larger than paving stones, often thirty feet high, thrown up by the waves of this narrow lake. It is shallow, and rendered turbid by very slight winds; the northern portion, above Cape Kitchinashi, is clear; near Gull Island the shore was lined with the cast-off skins of *Ephemeridæ*, forming a kind of windrow miles in length, concealing the sand, and at least a foot in width; the flying *Ephemeridæ* were very abundant and the mosquitoes, as seen at a distance, appeared like small clouds.

The Saskatchewan River is very rapid, and its banks are for the most part vast marshes; the same marshy character prevails as far as he went, for one hundred and fifty miles or more west of the lake, rendering the country unfit for cultivation.

Prof. Agassiz made a communication on the age

of some of the sandstones of North America, generally considered as the Old Red Sandstone.

Some of these had been designated by Mr. Marcou as Triassic, and he showed by characteristic calamites that the strata so named by the latter in New Brunswick were properly so called. The calamites exhibited from the strata of southern New Brunswick had a more elongated stem, fewer vertical furrows, and a greater distance between the joints, than the Carboniferous and Devonian forms, and had the aspect of Triassic calamites. He thought the New Brunswick fossils were different from the *C. arenaceus* of the Trias of Europe.

Mr. Marcou made a communication on the black slate of Braintree, Mass., containing *Paradoxides*, and on similar strata in Newfoundland, near Lake Champlain, and in the vicinity of Quebec.

The Braintree slate contains trilobites, and a *Conocephalus* has been discovered in the same formation in Newfoundland; here are two remotely separated points in North America, whose fossils indicate an age anterior to the Silurian, belonging to what Barrande calls the *faune primordiale*. Prof. James Hall found near Lake Champlain three trilobites in strata which he referred to the Hudson River group, or to the second fauna of Barrande; others obtained near Quebec were referred to the same group by Mr. Logan; and this whole chain of rocks has been referred by these and other geologists to the Hudson River group. Emmons long ago discovered these rocks in Vermont, and called them the "Taconic System;" this is equivalent to the primordial fauna of Barrande, and Emmons's name, given in 1846, four years before that of Barrande, should be substituted for *faune primordiale*.

The trilobites found near Quebec were obtained from the rocks at the Falls of Montmorenci; at the surface here is a horizontal limestone belonging to the Trenton group, and the rock which forms the falls is gneiss; below the falls are the black shales, very much upheaved, going back fifteen or twenty miles into the country, and indicating an immense thickness; Mr. Marcou had no doubt that the fossils were found in these shales, which are anterior to the limestone. The Potsdam sandstone, in New York, had until

recently yielded only a fossil *Lingula*; afterward a *Conocephalus* was discovered in it; Mr. Marcou considers this not the first fossiliferous stratum, but the last of a series containing the primordial fauna. These primordial forms have been found also in Wisconsin and Minnesota, and in Spain.

Mr. Marcou read extracts from letters of M. Barrande in reference to this subject.

The Corresponding Secretary read the following list of letters recently received :

From Mr. P. B. Du Chaillu, accepting Corresponding Membership; from the Leeds Philosophical and Literary Society, July 13; the K. K. Akademie der Wissenschaften, Wien, June 25; Zoologisch-Botanische Gesellschaft, Wien; Gesellschaft der Wissenschaften, Göttingen, June 3; Naturforschende Gesellschaft, Emden; Oberhessische Gesellschaft für Natur-und-Heilkunde, Giessen, June 2; the London Geographical Society, July 24; and the Literary and Philosophical Society of Manchester, May 31, acknowledging the reception of the Society's publications, or sending theirs in return.

Messrs. A. S. Bickmore, of Cambridge, and Robert T. Edes, of Dorchester; and Drs. A. D. Sinclair, of Boston, and J. H. Stickney, of Newton; were elected Resident Members.

November 7, 1860.

The President in the Chair.

Mr. Du Chaillu presented descriptions of mammals from equatorial Africa, collected by himself, and believed to be undescribed, as follows:—

(Continued from page 304.)

TROGLODYTES KOOLOO-KAMBA. This chimpanzee-like animal was discovered by me in the mountains of the interior, situated

near the head waters of Ovenga River, known by the natives under the name of Ashankolo; these mountains are hardly at all inhabited.

Immediately after killing the animal I was struck by the following outward characters, which led me to believe that it was a new species.

The general color of the hair black. The head rounded, the frontal ridge prominent, but less so than in the gorilla; the eyes wide apart; cheek-bones very prominent, and the cheeks hollow; nose very flat; mouth wide, the lips black, of uniform thickness, when shut not showing the mucous membrane; the muzzle not very prominent, and the chin rounded; the ears very large, in their form resembling much those of man, but larger; the round, black face surrounded by whiskers, commencing from the hair of the head and uniting under the chin, this appendage giving a very human look to the animal; the chest broad; the arms long, reaching below the knee, and indicating great muscular strength; the hand long and narrow, black and callous; the thumb very short, the back of the middle phalanx of the fingers callous, showing that the mode of progression is on all-fours, resting anteriorly on the knuckles; abdomen large, and rounded on the sides; the legs short, destitute of a calf; feet black, shorter than the hand; toes free like the fingers, showing the arboreal habits of the animal.

Length of the animal, measured from the dry skin, 4 feet 2 inches, but this may not be the exact length. Length of the hand, $11\frac{1}{2}$ in.; length of the foot from the hairy part of the heel, $10\frac{3}{8}$; length of the thumb, 2 in.; of the second finger, $2\frac{3}{4}$; of the middle finger, $4\frac{3}{8}$; of the fourth finger, $4\frac{1}{4}$; of the little finger, $3\frac{3}{4}$; circumference of thumb, $2\frac{1}{2}$; of second finger, $3\frac{3}{8}$; of middle, 4; of fourth, $3\frac{7}{8}$; of little finger, $3\frac{1}{4}$; length of great toe, $2\frac{5}{8}$; of second toe, $3\frac{1}{4}$; of middle toe, $3\frac{7}{8}$; of fourth toe, $3\frac{5}{8}$; of little toe, $2\frac{5}{8}$; circumference of great toe, $3\frac{3}{8}$; of second toe, $2\frac{1}{2}$; of middle toe, $2\frac{7}{8}$; of fourth toe, $2\frac{1}{2}$; of little toe, $2\frac{1}{2}$.

The chief external characteristic differences between this species and the *Troglodytes calvus* are the want of baldness, the more rounded face, the whiskers round the face, the less prominent muzzle, the higher cheek-bones, and the more hollow cheeks.

It differs from the adult chimpanzee in a rounder face, more prominent cheek-bones, and more hollow cheeks, larger ears, less prominent muzzle, and the whiskers round the face; and, it is important to add, the different name which the natives give to this animal.

The cry of the Kooloo-Kamba is very different from that of the *T. calvus* and chimpanzee, resembling the syllables "Kooloo," which I have heard, and from which it derived its name among the natives, — "Kamba" meaning "to speak," among one tribe; other tribes give to the animal only the name of "Kooloo."

This ape was killed by me in the Ashankolo Mountains. As I was returning to our camp, I heard the cry of "Kooloo, Kooloo," and asked my guide what it was; he said that it was a kind of "man of the woods," which I had not seen before, called Kooloo-Kamba. It was then too dark to go in search of the animal, but a little before daylight the next morning we got up and went toward the place where the ape had retired for the night. Daylight had nearly appeared, and I began to fear that the animal had left, when I was suddenly started by the cry of "Kooloo, Kooloo." I looked above, and saw the animal on the tree on which it had spent the night, and there killed it.

It is very seldom that this animal comes so near the coast, and as we brought it to the camp it was a great object of wonder to the men. It is said to live in the country much farther toward the mountains of the interior. The stomach contained nothing but vegetable food.

CERCOPITHECUS NIGRIPES. The black-footed Guenon, called "Ponday" by the natives. The general color was iron gray, each hair tipped and ringed with yellowish white on the sides, and with rufous on back of the neck and shoulders; lower half of the back, outside of fore legs, and feet of hind legs black; thighs cinereous gray, tipped and ringed with whitish; all the lower parts, and inside of fore-legs and thighs light rufous yellow. On the forehead a patch shaped like a horse-shoe of a yellowish white, terminating behind on a level with the ears; between and to the outside of the arms of the horse-shoe, black; near the tip of the ears on the inside a pencil-like tuft of yellowish rufous hair; face black, almost naked; cheeks hairy, yellowish rufous. Tail: basal

half above, blackish mixed with yellowish rufous ; terminal half, above and below, black ; under surface of basal half of tail, and round the anus, rufous chestnut. Female like the male, the under parts of a lighter tint.

Length to root of tail, 21 inches ; tail, 27 inches.

This beautiful species of guenon is found on the banks of the Ofoubour River, and in the mountainous regions of that country ; it is one of the least common of the numerous species which inhabit those immense forests.

OTOLICNUS APICALIS. The hair is very soft and woolly, mouse-colored or slaty at base, tipped on the upper parts with various shades of rufous, tinged with cinereous on the head, brightest and with an orange tint on the back and upper part of tail ; dorsal median line deep chestnut brown ; outside of limbs like back, fading toward the feet ; below, mouse-colored, tinged, especially on the interior of hind limbs, with yellowish white ; tail rufous for the first half above, the rest of upper and whole lower surface wood brown, with the terminal inch and a half, above and below, dirty yellowish white ; hands and feet above hairy to fingers and toes, palms and soles naked ; end of nose and chin yellowish white.

Length from nose to base of tail, 10 inches ; tail to end of hair, 14 inches. It may well be called the Rufous-backed Galago.

It is called "Abolo" by the natives. It lives in the forests, retiring by day to holes in trees, coming out at night in search of food, which consists of fruit and insects ; the male and female commonly dwell together ; I kept one for some time, and it thrived well, being very fond of cockroaches, bananas, and corn. It is found in the mountains of the interior, near the equator.

CYNOGALE VELOX. This resembles the Asiatic *Cynogale Bennetti* (Gray). I have now nothing but the skin of the animal, the skull having been destroyed by fire.

The teeth resemble those of the above genus of Gray, as well as the general appearance, but the size of the animal, the length and characters of the tail, and the habitat, indicate a distinct species.

Description. Head long, very flat ; the nose sharp, eyes very

small; ears also small, and sparingly clothed with hair; whiskers very stiff and bristly, most of them white; a few bristles of the same character on the cheeks, behind the eyes; neck thick; body stout and depressed; extremities small, the first joint enclosed within the skin of the body; feet five toed, plantigrade behind; soles bare; claws curved and sharp; fore claws very slightly if at all webbed; hind claws partially webbed, and the external border of the tarsus fringed with a membrane; tail stout, compressed laterally, the terminal three fourths sharp above and at the end below, terminating in a point.

Fur short, dense, and soft, near the skin and on the under parts downy, like the under fur of the otter; some coarser hair mixed with the fine fur above; fur extending about one fourth the length of the tail, ending in a point above, and less extended on the under part, the rest of the tail covered with very short, bristly, and closely applied hairs, forming a short crest along the upper edge; the tail in the living animal very shiny, from the shortness of the hair.

Color above, dark, shining brown, lighter on the sides, pale yellowish white below, almost pure white on the throat and chin and along the edge of the upper lip.

Length of the body from tip of the nose to base of tail, 15 inches; length of tail, $8\frac{3}{4}$ in.; length from tip of nose to ears, $2\frac{1}{2}$ in.; length of fore limbs to end of claws, $1\frac{1}{2}$ in.; length of hind limbs, 2 inches.

I have killed three of these animals, two of which were destroyed by fire; all were of the same size.

This extraordinary animal is found in the mountains of the interior, or in the hilly country explored by me north and south of the equator. It is found along the watercourses of limpid and clear streams, where fish are abundant; it hides under rocks along these streams, lying in wait for fish. It swims through the water with a rapidity which astonished me; before the fish has time to move, it is caught; on account of the rapidity of its movements I have given it the specific name of *velox*. The animal returns to land with its prey almost as rapidly as it started from its place of concealment. The great motive power of the animal in the water seems to be in its tail.

Only a single species of *Cynogale* being described, and that a native of Asia, I thought the different shape and proportions of the tail, with its African habitat, were sufficient to make this the representative of a different genus, for which I proposed the name of POTAMOGALE; preferring, however, to wait until I can procure the skull and skeleton, I have placed it in the genus *Cynogale*, to which it certainly bears a close resemblance.

SCIURUS NORDHOFFI. General color above, on the back black, tipped and ringed with orange rufous, on the head and tail tipped with white; last two thirds of tail obscurely ringed with black and white, almost hoary below; anterior limbs outside like the head, hind limbs like the back. Under surface scantily furnished with light rufous hair, grayish toward and on the throat and breast; inside of limbs light rufous; abrupt line of termination between the long hair of the sides and the scanty hair of the abdomen; feet black; whiskers long; teeth deep reddish orange. General character of hair rather harsh.

Length from the tip of the nose to base of tail, 13 inches; length of tail, 13½ inches. It is called "Ncongo" by the natives.

I take great pleasure in naming this species in honor of my friend Charles Nordhoff, Esq., of New York.

This species resembles the *S. caniceps*, (Temm.) but has not the lateral whitish band, nor the rufous spot behind the ears, and has, moreover, the lower parts and the inside of the limbs light rufous, and the tail more hoary beneath. It comes near, also, to the *S. Stangeri*, (Waterh.,) from Fernando Po, but has not the abdomen barred with black.

This squirrel is one of the largest and one of the rarest I have met with in Africa. It is found in the mountainous country situated near the Ashira prairies, at a distance of one hundred and fifty miles from the coast, and one degree south of the equator.

SCIURUS EBORIVORUS. General color above shining black and bright rufous, arising from the hairs being black, ringed with the latter and tipped with the former, the rufous on the head becoming whitish. Lower parts scantily furnished with hair, grayish on the throat and breast, and brownish on the abdomen; feet

bright reddish rufous. Tail long, of four different colors, first $2\frac{1}{2}$ inches like the back, next 5 inches bright rufous, mixed with a few shining black hairs, next 5 inches indistinctly ringed with black and white, and last $2\frac{1}{2}$ inches black. Abrupt line of termination between hair of sides and abdomen, grayish along this line; blackish about and behind the ears, which are slightly tufted; hair rather harsh. Length from the tip of the nose to base of tail, $11\frac{1}{2}$ inches; length of tail, 15 inches.

It is called "Mboko" by the natives, and may properly be styled the "ivory-eater."

This species of squirrel is one of the most remarkable animals I have met in western equatorial Africa. The Mboko is known in that region as the great ivory-eater. It shows a curious partiality for ivory, and loves to feed on the newly fallen tusks of the elephant, but does not touch them after they have lain on the ground long enough to lose the animal matter; many tusks are found with the marks of its teeth.

The fame of the Mboko has gone out even among the tribes inhabiting the country where it is not found, and, though it is not met with on the sea-shore between two degrees north and south of the equator, all the tribes know the animal by reputation. The porcupine of this part of Africa is said by the natives to feed sometimes on the tusks of the elephant.

This species was discovered by me in the mountains of the interior, where the Ovenga River takes its source, at a distance of about one hundred and forty miles from the coast, and one degree south of the equator.

SCIURUS WILSONI. General color above mixed rufous and black, the rufous prevailing on the outside of the limbs; lower parts scantily furnished with yellowish rufous hair; throat yellowish white; tail very bushy and silky, with a purplish red tinge, tipped with whitish; whiskers black; teeth reddish orange; abrupt line of termination between hair of the sides and abdomen. Length from the tip of the nose to base of tail, $11\frac{3}{4}$ inches; length of tail, $11\frac{1}{2}$ inches.

I propose the name of *Wilsoni* for this species in honor of my good and dear friend, Rev. John Leighton Wilson, D. D., of New

York, and formerly missionary in Western Africa. I have not the native name of this animal.

The only squirrel that I find described in any way resembling this is the *S. rufobrachiatus*, (Waterh.,) from Fernando Po; but in the latter, the inside of the limbs is reddish rufous instead of yellowish white, and the tail is ringed with black and rufous, instead of purplish red tipped with white.

This squirrel is also one of the rarest I have found in Africa. It is found in the mountainous country situated on the head waters of the Ovenga River, and lives among the trees.

SCIURUS SUBALBIDUS. In this animal the hair is thicker, shorter, and softer, and the under parts are more densely covered than in most other squirrels of tropical Africa.

The general color above is a mixed rufous, yellowish, and black, darkest and brightest in the middle of the back; each hair is mouse-colored at the base, then ringed with yellowish, yellowish rufous, and black, and tipped with the latter. The yellowish becomes nearly white on the forehead; the lower parts from chin to vent, the inside of fore-arms and thighs, yellowish white, whitest on lower portion of throat; sides more brownish than back, this color encroaching on the lower parts, especially on the anterior half of the abdomen, which is considerably tinged with it; about nose and lips light brown; whiskers long and black; narrow yellowish white circle around eyes; outer side of limbs like the back, more tinged with rufous, and bright bay on the posterior edge of fore and hind limbs, forming a ring just above wrist and heel; the hair reaches above to the beginning of toes, extending beyond the claws; the soles and palms naked; no line of separation between hair of upper and under surfaces of the body; tail much like the middle of back, each hair yellowish rufous at base, and then ringed alternately with black and yellowish rufous, the tip being yellowish white, and almost white near the end of the tail; terminal brush browner; under surface of tail barred with bright bay instead of yellowish rufous; tail distichous; incisors deep orange. Length to base of tail, 10 inches; tail, 11 inches.

From Fernando Po.

It comes near the *S. rufobrachiatus*, (Waterhouse,) but has not the interior of the limbs of a rufous color, which Temminck says

is characteristic of the latter species, and the upper incisors are not longitudinally grooved.

SCIURUS RUBRIPES. General color slate tipped with yellow; from the shoulder backward an indistinct yellowish white stripe, fading away before reaching the thighs; lower parts and inside of limbs yellowish white, tinged on the latter with chestnut; head dark chestnut; whiskers black; outside of limbs bright chestnut; tail black, tipped with white above, and chestnut on the under surface; teeth orange yellow. Length from tip of the nose to base of the tail, $9\frac{1}{2}$ inches; length of the tail, $5\frac{1}{2}$ inches.

This resembles the *S. pyrrhopus*, (F. Cuv.), from the Guinea coast; but the tint is not greenish, the lateral band is yellowish white, the tail differs in its chestnut lower surface and whiter tips, and the head and outside of limbs are chestnut instead of tawny.

This beautiful red-legged squirrel is found in the country watered by the rivers Nazareth, Ogobai, Fernand-Vaz, Rembo, and Ovenga, running through a country situated two degrees south of the equator. It inhabits the forests of equatorial Africa, and is found in the interior as far as I have been. It is called by the natives "Ngori."

SCIURUS MINUTUS. Color bright ferruginous above, beneath tawny; tail with alternate black and rufous bands; base of the fur, above and below, plumbeous; whiskers long and black; muzzle yellowish white; ears scantily furnished with yellowish white hair; teeth whitish yellow, lower incisors diverging at the points; well clothed with hair on the lower parts. Length from tip of the nose to base of tail, 3 inches; length of tail, 2 inches.

This beautiful little squirrel, which is thus far the smallest known, is called by the native tribes inhabiting the head waters of the Ovenga River "*Kendo*." It is always found on the trees of the forest, and to get a sight at it is most difficult, not only on account of its small size, but of its constant and rapid movements.

It is found on the mountainous range or table-lands situated in the interior from the western coast of Africa, between two degrees

north and two degrees south of the equator. I did not meet it in the maritime plains situated between these mountains and the sea.

Mr. Du Chaillu also exhibited the skull of a manatee from Western Africa, called "Manga" by the natives of the Camma country. Thinking it to be a new species, he had proposed for it the name of *Manatus Oweni*, but it probably belongs to the *M. Vogelii*, (Owen,) from the rivers of Central Africa, if that be specifically different from *M. Senegalensis* (Cuv.). The molars are $\frac{2}{3}$, of which six are in use on each side of each jaw.

General color dark plumbeous. Skin smooth, on which is scattered all over the body single bristly straight hairs from half an inch to an inch long; eyes very small; paddles without nails. The largest seen by him measured 10 feet in total length; length of paddle from below, 14 inches; greatest width of the tail, 23 inches.

It is found in the Nazareth, Mexias, Fernand-Vaz, Npoulounay, Ogobai, Rembo, Niembai, and Ovenga rivers, and also in the Anengue Lake. It frequents places where the water is still, or where the current is not strong. It feeds on the leaves of some of the trees growing on the banks of these rivers, whose branches fall into the stream, or on the grass growing in the water. During the rainy season, when the amount of fresh water coming from the interior prevents in the rivers mentioned the water of the sea from mixing with that of the river, this manatee is often found but a few miles above the mouth of the river. During the dry season, the amount of fresh water from the interior being less, and the sea-water flowing with the tide up these rivers to a certain distance, the manatee ascends higher up, in order to be in fresh water. It is very fat, and the skin is very thick, by drying becoming black and granulated.

Dr. Bryant communicated the following notice of a visit to Green Island, some ten miles out at sea, off the mouth of Chester Bay, Nova Scotia, by the Rev. I. Ambrose, M. A., Halifax, in a letter to J. Matthew Jones, Esq.

On June 28, 1860, he landed on the north side of the island. Not a puffin or any other kind of bird was to be seen, save a large

number of "steering" gulls and some "mackerel" gulls flying overhead, whilst the whole island under foot was perforated and undermined by the petrels. He says :

"I first took a tour all around the grassy edge of the cliffs to look for gulls' eggs. I got two dozen of the 'steering gulls' eggs, and the men eight dozen. Tore up the turf with my hands, following the little galleries with my fingers, and soon secured four dozen and a half of petrels' eggs, and two of the parent birds as specimens. I could have obtained, I suppose, a thousand dozen of the eggs if I had wished, and every mother bird with them, as the poor little things crowd back into their holes, making not the slightest noise or resistance whilst they behold the roof rudely torn from their dwelling, and their eggs taken away. In no instance, except one, did I find more than one egg in a nest, and in that there were but two; and yet some of the birds were hatching, as some of the eggs contained the embryo with its head and body so far developed as to clearly identify the species. The smell of the birds is at first very offensive; indeed we perceived it at a distance of two miles from the island. This smell is not occasioned by any decayed fish or other extraneous matter, as the nests and surrounding turf are invariably very clean, the nest itself being lined at the bottom with a very little dry fine grass. The odor is peculiar to the bird and its egg, and is particularly perceptible in the dark brown oily fluid which, seemingly in self-defence, these birds eject from their bills.

"The sun was just rising when we landed on the island, and although we had seen several petrels flying about the boat in the night and at dawn of day on our passage, yet on the island not one was to be seen. All were underground, where at first you could hear their twittering, as if arranging about nests and accommodations; but soon after sunrise they became almost entirely silent, at least so far as the screaming of the gulls, which was always about the same, would allow you to judge. On taking a petrel out of its nest, it would not on being set down attempt to fly at first, but would endeavor to dig its way down into some of the broken holes. Most of the nests seemed to be old ones newly fitted up, and I found several such where the bird had brought quite a sprinkling of fresh dirt out to the surface. They seem to form their galleries not so much by carrying out the surplus dirt, however, as by pressing themselves through the soft turfy soil. A great many ants had made their nests among the galleries, but did not seem to incommode the birds; perhaps, indeed, they serve them for food at times.

"I saw no traces of mice or rats on the island, and but few insects, but a dead gull had been torn to pieces and eaten by something, so that

only the head and bill were left. I found several dead *sheep*, but nothing seemed to have touched them. Probably *hawks* frequent the place.

"Green Island is about the size of 'George's Island' in Halifax harbor, and is almost round in shape, being, however, a little longer in its east and west diameter than in that running north and south. It is composed of a blue slate rock thickly barred with grayish veins, and covered with a light, brown, turfy soil. A good deal of grass grows on the place—hence its name. And there is a small pond of half stagnant rain-water on the top of it in a little valley, bordered with the wild flag. Not a tree or shrub grows on it. The only flowers I saw were the flag blossoms, white violets, and a small plant with a leaf like that of the wild rose and a blossom like the buttercup. The rock of which the island is composed is fireproof, and is the same as that at the 'Raggeds,'—some scattered islets and points lying about northwest from Green Island, and near Lunenburg.

"I had not time to examine the shore for shells as thoroughly as I wished, as the men were pressed for time; but I fear the sea soon smashes all that are washed ashore, as the beach is more than half composed of small fragments of shells. Large masses of stone are to be seen, which have evidently been split off by the frost, but the rock not being liable, like granite, to disintegrate by rain, retains its square shape."

The following is the full report on the subject referred to by Mr. Marcou at the preceding meeting:—

ON THE PRIMORDIAL FAUNA AND THE TACONIC SYSTEM, BY
JOACHIM BARRANDE; WITH ADDITIONAL NOTES, BY JULES
MARCOU.

The discovery of *Paradoxides Harlani* at Braintree, and that of *Paradoxides Bennetti* and *Conocephalites* at St. Mary's Bay, Newfoundland, in slates until then regarded as Azoic and placed among the crystalline and primary rocks, show plainly that the Primordial fauna is represented also on the Atlantic coast of North America. These are not isolated facts, but rather two landmarks showing the existence of strata occupying an important place in the system of stratified rocks.

In a letter dated Paris, 29th May, 1860, M. Barrande says:—

"If you see Prof. W. B. Rogers I beg you to thank him for his three beautiful photographs of *Paradoxides Harlani* (Green,) which he was

so kind as to send me. They were very interesting to our Geological Society (of France) where I showed them, stating that this species is identical with *P. spinosus* of Bohemia. This is a very important fact, and should have a happy result, that of establishing the relative age of the most ancient formations on the two continents."

In his note "On the *Primordial Fauna*," (see "*Bul. de la Soc. Géol. de France*," vol. XVII. p. 551,) M. Barrande gives it as his opinion that the *P. Bennetti*, though differing from the *P. spinosus* of Bohemia, belongs to the same group of fossils.

This being established, let us proceed a little farther and see if previous discoveries and published records permit the extension of the Primordial fauna over some other portions of North America.

Prof. E. Emmons in his geological survey of Lake Champlain, as far back as 1838, recognized below the Potsdam sandstone a series of strata, which he described at length in 1844, and named the *Taconic System*. The fossils then found by Prof. Emmons were few in number and so badly preserved that some doubts may have been entertained at that time as to their determination and value as characteristic fossils. Nevertheless, his *Eliptocephalus asaphoides* was a Trilobite form so different from those known in the other strata of New York, that a skilful paleontologist would not have let it pass without further inquiry.

The principal argument of Prof. Emmons was based on stratigraphical and lithological grounds, and the numerous sections and descriptions of rocks accompanying his Taconic system are certainly conclusive, so far as geognostical characters are concerned. The paleontologist of the State of New York rejected the Taconic system, and, siding with other opponents of Prof. Emmons's discovery, in his first volume of the "Paleontology of New York," (1847,) Mr. James Hall assigns the age of the *Hudson River* group to the strata of the *Taconic system*, explaining the difference of lithological characters by metamorphisms, the discordance of stratification and the different thickness of the strata by folding and faults; the fossils he regards as badly determined. His opinions are not supported by detailed sections, but he refers to the *Introduction* of his work for explanation, which *Introduction* as yet remains unpublished.

Since 1844 Prof. Emmons has continued his observations and discoveries on those *bottom rocks*, and in 1855 he gave a more complete account of his Taconic system in the second part of his "American Geology." This book has unfortunately escaped M. Barrande's inquiries, for his attention would be strongly drawn to the new Taconic fossils it contains. It is evident from the new specimen of *Eliptocephalus asaphoides*, from the shales of Washington County, New York, figured Pl. I, fig. 18, that this trilobite is a *Paradoxides* related to the group of *P. spinosus*, perhaps identical with the *P. Harlani* of Braintree. Besides, the trilobite figured Pl. I, fig. 16, and called *Atops trilineatus*, is a true *Sao*, which genus is among the most characteristic of the Primordial fauna of Bohemia and Scandinavia. Prof. Emmons has thus found at least two trilobites of the Primordial fauna in slates forming part of his Taconic System. Trilobites are the most important fossils for the determination of the age of the oldest strata; the labors of M. M. Barrande and Angelin have shown with what certainty geologists can rely upon them. Other less significant fossils have been found by Emmons, such as *Graptolites*, *Lingule*, and *Obol*i. Sections and very detailed descriptions of strata show that the Taconic system, as defined by its discoverer, is composed of shales, slates, limestones, dolomites, conglomerates, sandstones, and iron breccia, whose combined thickness is between 25,000 and 30,000 feet, always resting on granite, gneiss, quartzite, and other crystalline rocks; that it lies at the base of the Silurian (such as the Silurian was first established in England and in America); and that this *bottom formation* extends, according to Emmons himself, from Newfoundland to Maine, Canada, Vermont, Massachusetts, Rhode Island, and along the Alleghanies to Georgia.

A discovery made some time since, but only published last year, has brought before the scientific world new forms of fossils, which, according to M. Barrande, unquestionably belong to the Primordial fauna. The following is the statement of M. Barrande, contained in a letter to Prof. Bronn of Heidelberg, to be published in the German Geological Journal: "*Neues Jahrbuch für Geologie und Petrefakten Kunde*."

"Paris, July 16, 1860.

" I have recently received, thanks to the kindness of M. E. Billings, the learned paleontologist of the Geological Survey of Canada,

a very interesting pamphlet entitled 'Twelfth Annual Report of the Regents of the University of the State of New York, 1859.' If you possess this publication, you will find there, at page 59, a memoir of Prof. J. Hall, entitled 'Trilobites of the Shales of the Hudson River Group.' This savant there describes three species under the names *Olenus Thompsoni*, *Olenus Vermontana*, and *Peltura (Olenus) holopyga*. The well-defined characters of these trilobites are described with the clearness and precision to be expected from so skilful and experienced a paleontologist as James Hall.

"Although the specimens are incomplete, their primordial nature cannot admit of the least doubt, when the descriptions are read, accompanied with wood engravings which the large dimensions of these three species render sufficiently exact. The first is 105 millim. long by 80 broad, the other two are somewhat smaller.

"The heads of the two *Oleni* being deteriorated, the furrows of the glabella cannot be recognized. The thorax has a common and remarkable character, which consists in the greater development of the third segment, the point of which is stronger and longer than in all the other pleura. This is a striking resemblance to the *Paradoxides*, the second segment of which has the same peculiarity. Besides, there is an intimate relation between these two primordial types, and we should not be surprised if America furnished us with forms uniting most of their characteristics. The pygidium of *O. Thompsoni*, the only one that is known, shows no segmentation, and attests by its exiguity its relation to a primordial trilobite. *P. holopyga*, by its whole appearance, resembles the species of Sweden so well known by the name of *P. Scarabæoides*.

"Thus all the characters of these three trilobites, as they are recognized and described by J. Hall, are those of the trilobites of the primordial fauna of Europe. This is so true, that I think I may say without fear, if M. Angelin, or any other paleontologist practised in distinguishing the trilobites of Scandinavia, had met with these three American forms in Sweden or Norway, he would not have hesitated to class them among the species of the Primordial fauna, and to place the schists enclosing them in one of the formations containing this fauna. Such is my profound conviction, and I think any one who has made a serious study of the trilobitic forms and of their vertical distribution in the oldest formations will be of the same opinion.

"Besides, all who have seriously studied paleontology know well that each geological epoch, or each fauna, has its proper and characteristic forms, which once extinct reappear no more. This is one of the great and beautiful results of your immense researches, which have generalized this law, recognized by each one of us within the limits of the strata he describes.

"The great American paleontologist arrived long since at the same conclusion, for in 1847 he wrote the following passage in the *Introduction* to the first volume of the Monumental Work consecrated to the Paleontology of New York.

"Every step in this research tends to convince us that the succession of strata, when clearly shown, furnishes conclusive proofs of the existence of a regular sequence among the earlier organisms. We are more and more able, as we advance, to observe that the Author of nature, though always working upon the same plan and producing an infinite variety of forms almost incomprehensible to us, has never repeated the same forms in successive creations. The various organisms called into existence have performed their parts in the economy of creation, have lived their period and perished. This we find to be as true among the simple and less conspicuous forms of the paleozoic series, as in the more remarkable fauna of later periods.' — J. Hall, '*Pal. of New York*,' l. p. XXIII."

"When an eminent man expresses such ideas so eloquently, it is because they rise from his deepest convictions. It must then be conceived that J. Hall, restrained by the artificial combinations of stratigraphy previously adopted by him, has done violence to his paleontological doctrines, when, seeing before him the most characteristic forms of the *Primordial fauna*, and giving them names the most significant of this first creation, he thinks it his duty to teach us that these three trilobites belong to a horizon *superior* to that on which the second fauna is extinguished.

"In effect, according to the text of J. Hall, the three trilobites in question were found near the town of Georgia, Vermont, in schists which are superior to the *true Hudson River group*. In his works J. Hall does not go beyond indicating the horizon of certain fossils, and no one would think of asking a guaranty for such indications. But on this occasion the great American paleontologist thinks it necessary to support his stratigraphical determination by another authority, chosen from the most respectable names in geology. The following is the note which terminates his Memoir.

"NOTE.— In addition to the evidence heretofore possessed regarding the position of the shales containing the Trilobites, I have the testimony of Sir W. E. Logan, that the shales of this locality are in the upper part of the Hudson River group, or forming a part of a series of strata which he is inclined to rank as a distinct group, above the Hudson River proper. It would be quite superfluous for me to add one word in support of the opinion of the most able stratigraphical geologist of the American continent.'

"Now, when a savant like J. Hall thinks himself obliged to invoke

testimony to guarantee the exactness of the position of a few fossils, it is clear that the determination of this position is difficult.

“ In order to understand these difficulties I have consulted the maps and documents relating to the State of Vermont and the country in which the town of Georgia is situated, and, although the library of our Geological Society does not contain all that one could wish on this subject, I recognized easily that Georgia is placed in the region where the order of succession of the deposits is the most obscured by foldings and dislocations; so that the position of the schists in question could not have been determined by the incontestable evidence of direct superposition. Besides, the physical appearance of these schists is not that of the rocks constituting the typical group of Hudson River. This is verified by the Note of J. Hall, for it tells us that Sir W. E. Logan is inclined to make a distinct group of these schists *superior* to that of the Hudson, and which consequently *would crown the whole Lower Silurian division* of the continent.

“ For the above reasons, the geological horizon on which the three *Oleni* of Georgia were found appears to me to have been but uncertainly determined at first view, and even in complete opposition to paleontological documents.

“ I do not think, then, that I weaken in the least degree the respect and confidence justly inspired by the labors of the American savants whose names have just been mentioned, when I ask them in the name of science to make new researches and new studies, that may lead to a final and certain solution of this important question.

“ Doubtless, thanks to the progress of our knowledge, we are now no longer bound by the ancient conception of the simultaneous extinction and the total renovation of the faunæ. For myself, in particular, it would not be possible to accuse me of similar views at the moment when I publish the explanation of my doctrine of colonies. But you will perceive that the facts which I invoke in support of this doctrine are far from sustaining the reappearance of a fauna after the extinction of the following fauna, which the three trilobites of Georgia would do, if they had really lived after the deposit of the Hudson River group.

“ This reappearance would be still more astonishing, as among the three great Silurian faunæ the second fauna occupies the greatest vertical space and is probably the one which enjoyed the longest existence. Thus, to verify such a reappearance, the most incontestable proofs are required, for such a decision would oblige the entire re-formation of one of our most important scientific creeds.

“ Yours very truly,
“ J. BARRANDE.”

Prof. Emmons has always regarded these black slates of Georgia as part of his Taconic system, and more, he refers them to the base of the upper division of the Taconic rocks (see "*American Geology*," part II. p. 49). The strata are dislocated and upheaved at Georgia, and as far as my knowledge of the geology of the vicinity of Burlington, Isle La Motte, Chazy, and Rouse's Point extends, acquired in an exploration of a few days in 1849, I am far from agreeing with the statement made by Messrs. Logan and Hall that the strata of Georgia are of the age of the Hudson River group. Mr. Emmons, I think, rightly refers them to the Taconic system, and the discovery of the three primordial trilobites confirms the view arrived at by him only through their stratigraphical and lithological characters.

In another letter, dated Paris, 14th August, 1860, M. Barrande says:—

"You will easily perceive the interest and importance of the question, even if it were only raised on account of the three *Oleni* of Georgia; but it takes in now a much wider field, owing to a letter I have just received from Mr. Billings, official paleontologist of the Geological Survey of Canada, who informs me that he has found lately, in the schists and limestones near Quebec, considered as being the prolongation of those in question in Vermont, nearly one hundred species, almost all new. Twenty-six of these come from a white limestone, and seem to him to be the true representatives of the Primordial fauna, and he cites among them *Conocephalites*, *Arionellus*, *Dikellocephalus*, etc., that is, very characteristic forms of this fauna.

"In another limestone, which is gray, he finds thirty-nine species, all different from the first, and representing, on the contrary, the most distinct types of the second fauna. Finally, the black schists furnish him with *Graptolites*, *Lingulæ*, etc., etc., fossils which at first sight cannot determine a horizon, because they are found upon several Silurian horizons.

"While waiting for the very obscure stratigraphical relations to be disentangled, and without engaging in any manner Mr. Billings, who should preserve the independence of his opinion, I may yet express to you my view wholly personal, and of which at this moment I take the entire responsibility. I think, then, that this region of schists and limestones of Vermont, in other words the *Taconic system*, will reproduce in America that which took place in England as to the Malvern Hills, and in Spain for the Cantabrian chain,—that is to say, the Primordial

fauna, after having been disregarded, will regain its rights and its place, usurped by the second fauna.

"You see it is a great and noble question, whose final solution will complete the imposing harmonies existing already between the series of paleozoic faunæ of America and that of the contemporaneous faunæ of Europe, leaving to each the imprint peculiar to its continent.

"I can well imagine, from the position previously taken by our learned American brothers on the subject of the Taconic system, that the final solution of which I speak will not be obtained without debate, and perhaps some wounding of self-love, for some opinions that appear to be dominant must be abandoned.

"But experience has taught me that in such cases the most elevated minds turn always first to the light, and put themselves at the head of the movement of reform. Thus, when in 1850 I recognized the Primordial fauna in the Malvern Hills, where the second fauna only had been found, Sir Henry de la Beche and Sir Roderick Murchison were the first to adopt my views, to which little by little the other official geologists agreed; Ed. Forbes ranged himself publicly on my side in 1853 in 'The Geological Survey,' while others still hesitated, and now there is no longer any opponent.

"I think it will be nearly the same in America, and that in some years from now the opinions of your savans will have undergone a great change as regards this question.

"It is a fine opportunity for Dr. Emmons to reproduce his former observations and ideas with more success than in 1844.

"Yours very truly,

"J. BARRANDE."

I would add to the above letter a few words on the geology of the vicinity of Quebec. Twelve years ago I passed a few days in that region, and my opinion, formed from my own observations made at that time, differs wholly from the publications of Mr. Logan and Dr. Bigsby on the subject. Dr. Bigsby (*On the Geology of Quebec and its environs*, "Quart. Journ. of the Geol. Soc. of London," vol. IX. p. 82, 1853,) refers all the strata, except a narrow band of limestone north of Quebec, to the Hudson River group; the limestone band extending from Montmorency to Indian Lorette is determined by him as Trenton limestone. The fossils upon which he relies for placing the Quebec strata in the Hudson River group are only a few *Graptolites*. Dr. Bigsby admits that the Hudson River group is enormously developed in that part of North America, that it is composed of rocks almost azoic, and that he does not understand

clearly how what he calls the Hudson River group came to be conformable to the gneiss, with two unconformable and widely different strata of great thickness interposed. Mr. Logan is of the same opinion as Dr. Bigsby on the age of the strata in the vicinity of Quebec, and moreover he gives an explanation of what puzzled the Dr. so much. In his "*Report of Progress for the year 1852-3,*" p. 35 and 36, Mr. Logan explains the discordance of stratification between the Trenton limestone and the Quebec bituminous black and gray slates, by an *anticlinal axis* complicated by a *fault*. It must be observed that Mr. Logan admits that he cannot give any precise facts by which to determine the position of the anticlinal. I quote his description of the Montmorency Falls section.

"The details of the fault are well displayed at Montmorency Falls; here the channel of the river is cut down through the black limestone beds of the Trenton formation to the gneiss of the anticlinal ridge, and the water at and below the bridge flows down and across the gneiss, and leaps at one bound to the foot of a precipice, which, immediately behind the water, is composed wholly of this rock. At the summit of the cascade, the Trenton beds on each side have a thickness of almost fifty feet, and they are marked by *Trinucleus concentricus*, *Calymene senaria*, *Conularia quadrisulcata*, *Leptaena sericea*, *L. delloidea*, *Orthis testudinaria*, and *Lingula*. The dip of these beds is down the stream at a very small angle; but at the foot of the precipice, and in immediate contact with the gneiss, about the same thickness of limestone is tilted up to an angle of fifty-seven degrees; it is followed by a similar amount of black bituminous shale with the same slope; in this attitude these rocks climb up the face of the precipice, presenting their edges to the chasm on each side. They are followed by about eight feet of strong hard gray sandstone, weathering brown, in beds of ten to eighteen inches, interstratified with black shales, to which again succeed gray arenaceous-argillaceous shales, composing the sides of the chasm, out to the waters of the St. Lawrence. The limestones belong to the Trenton, the black shales to the Utica formation, and the gray to the Loraine shales."

When at Montmorency Falls, 28th Sept. 1849, I made the following notes. The fall is formed by a quartzite rock passing to mica-schist (gneiss of Messrs. Logan and Bigsby) with traces of substratification, and running east 20° north, to west 20° south; at the foot of the fall and in contact with the quartzite there is a

series of black bituminous slates, with intercalations now and then, more especially near the base of the fall, of small beds of limestone. This system of slate is strongly upheaved, the beds dipping east east south at an angle of 60° , and near the foot of the fall they are almost vertical. They form a sort of amphitheatre around the falls and are prolonged toward the St. Lawrence River, disappearing beneath the water and reappearing at the Isle of Orleans. I find no fossils in this system. The upper part of the fall is formed by a series of blue limestone 40 or 50 feet in thickness, almost horizontal near the bridge, but inclined from 10° to 15° east east south, on the left side of the fall near the chasm. This limestone, which is a little marly, rests directly on the quartzite rocks; it contains immense numbers of ramose corals, which were submitted in 1850 to Milne Edwards and Jules Haime, and were identified by those learned paleontologists with the *Alveolites repens* (Fougt.) of the Upper Silurian of Dudley and Wenlock in England and of Gothland in the Baltic, and nearly related to, if not identical with, a ramose coral of the Niagara group at Lockport. The *Alveolites repens* was the only fossil found by me at Montmorency, and was noted with the suggestion that the limestone belongs to the Trenton or perhaps the Niagara group. The quartzite and mica-schist *have upheaved the bituminous black slates, and the almost horizontal strata of limestone have been deposited after the dislocation.* This description of Montmorency Falls differs widely from the description published by Mr. Logan, and, now that the question of the Primordial fauna and the Taconic system is brought forward, I have no doubt that those black slates at the foot of Montmorency Falls, the strata of the Isle d'Orleans, the city of Quebec, the Plains of Abraham, Point Levi, all the south shore of the St. Lawrence going up the Chaudière River as far at least as the Chaudière Falls, which are all strongly elevated, dislocated, and follow the general direction east 20° north to west 20° south, belong to the Taconic system of Vermont and Eastern New York, and that in this system the fossils belonging to the Primordial fauna have been found. I did not see the anticlinal axis with fault, described by Mr. Logan, and I explain the relations of the rocks by a *discordance* of stratification, caused by upheaval an-

terior to the deposit of the Montmorency Bridge limestone. At Indian Lorette the section is almost identical with that of the Montmorency Falls. In the direction of Beauport I picked up in some limestone quarries several brachiopoda which resemble Trenton brachiopoda, but they were never determined in a regular way. They are now in the collection of the *Jardin des Plantes* at Paris, with my other gatherings in North America during the years 1848, '49, and '50.

Mr. Salter, who has examined the fossils picked up by Dr. Bigsby at Montmorency, Beauport, and Indian Lorette, regards them as indicating the Trenton limestone, and Mr. Logan gives a list of fossils indicating for the limestone at the summit of the cascade the Trenton age. In accordance with these two geologists, I regard those horizontal beds of limestone as representing the Trenton limestone of New York, although I think the presence of the *Alveolites repens*, an Upper Silurian coral, in those rocks, requires further inquiry before arriving at a final conclusion on all the rocks found at Montmorency.

The fifty feet of limestone pointed out by Mr. Logan at the foot of the fall, and in immediate contact with the gneiss, I did not see, and it is difficult for me to believe that fifty feet of limestone could have escaped my notice when my attention was entirely fixed on the stratigraphical phenomena of the section of Montmorency Falls. But it is such a celebrated place for excursions and of such easy access, that the verification of the question by a geologist can readily be made. Even if these fifty feet of limestone are there, it is to be proved that they contain Trenton fossils, which Mr. Logan does not say.

Messrs. Logan and Hunt, in previous works, (" *Report of Progress of the Geological Survey of Canada, for the year 1847-48,*" and, " *Esquisse Géologique du Canada, avec une Carte Géologique du Canada,*" Paris, 1855,) have described and colored all the country east of Montreal, between Lake Champlain and Quebec, as occupied *exclusively* by strata of the age of the *Hudson River group* and *Oneida sandstone*, or *Richelieu slates* and *Sillery formation*, with some patches of *Trenton limestone*. It is certain that the *Taconic system* occupies the *main part* of the country, and that the geological map of Lower Canada is to be greatly modified to be put in harmony with the Primordial fauna formation.

I have been informed lately that Messrs. Logan, Hunt, and Hall maintain the age of the Hudson River group for the strata of Quebec and Georgia on stratigraphical grounds, which to Mr. Logan are very clear; and that they are disposed to think the so-called Primordial fauna extends much higher in Canada than in Europe, and has *reappeared after a first extinction*. Such a decision should not be reached without the most decisive proofs, for it breaks through the laws of paleontology, and annihilates almost all the results arrived at by the labors of Smith, Cuvier, Brongniart, De Buch, D'Orbigny, Agassiz, Barrande, etc., for the last fifty years. Nor is this the first attempt of geologists recognizing Mr. James Hall as their leader against the recognized laws of paleontology. During the last six years they have placed an Oligocene flora *below* the cretaceous rocks, a Triassic flora *among* what they call Jurassic rocks, Jurassic fossils *in* cretaceous rocks, the mountain limestone fauna *above* the coal-measures, cretaceous fossils *in* Triassic rocks, etc. etc.

There is at least one proof that Messrs. Hall, Logan, and Hunt can give, to show that the Primordial fauna extends over the second fauna, — it is to show, in those parts of New York where the strata are without dislocation and succeed regularly, such as Utica, Loraine, Pulaski, and the neighborhood of Rome, that the Primordial fauna is *above the second fauna*.

There is only one point on which I differ from Prof. Emmons, — it is as to the propriety of placing the Potsdam sandstone as the *base* of the Silurian. Until now not a single fossil of the Calciferous sandrocks, of the Black River group, or of the Trenton group, has been found in the Potsdam of the State of New York; on the contrary, it contains the Primordial fauna, such as *Conocephalites*, *Dikellocephalus*, *Orthis*, and *Lingula*. Thus, the Potsdam group is paleontologically entirely independent of the Lower Silurian, while it possesses fossils belonging to the Taconic system. I am not sufficiently acquainted with its distribution and position as regards the Taconic and the Calciferous sandrocks to give a decided opinion based on stratigraphical grounds, but from the description of Prof. Emmons in his *Taconic system*, and from what I have seen at Little Falls, the Calciferous sandrocks are certainly very differently distributed from the Potsdam, and a dislocation and disturbance of strata have taken

place between the two groups. Instead of regarding the Potsdam as the *first* term of the Silurian rocks, I think it is the *last* one of the Taconic system, which changes its place of *bottom rocks* containing fossil remains into that of *cover*, capping a system of 30,000 feet of fossiliferous strata, containing at different levels, especially the upper half, the remains of organic beings left by the Primordial fauna.

The Taconic system, contrary to the other members of the Paleozoic series of North America, has been subjected to dislocations on a vast scale, and presents almost always strata upheaved, broken up, and in the most disturbed state, with the exception of the upper portion or Potsdam group. Generally, along the Alleghany range, the Lower Silurian rocks follow immediately; although in Canada, Vermont, and New York, patches of Hudson River group, Utica slate, Trenton limestone, Chazy limestone, and Calciferous sandrocks, indicate that the Lower Silurian strata have recovered in discordance of stratification some parts of the country where the Taconic strata were upheaved and dislocated. In Pennsylvania, Virginia, and North Carolina, New Red Sandstone covers the Taconic strata, probably, also, in Maine and New Brunswick. In the elevation of land comprised between the Upper Mississippi, Lake Superior, and Lake Michigan, the Taconic system is well developed, resting on granite; it is formed of slates, mica-schists, quartzites, limestones, iron breccia, and is terminated by what D. D. Owen has called *Lower sandstone of the Upper Mississippi*, or *formation I*. Until now, fossil remains have only been found in the upper part of the system, on the St. Croix River, where Mr. Owen has indicated and described Trilobites and Lingulæ, indicating the Primordial fauna. Fragments of Primordial Trilobites, and Lingulæ, have also been found near Lake Michigan, and on the Menomonee and Escanaba rivers. On the southern part of the elevation of land alluded to, the Taconic strata are followed and recovered by the Silurian rocks, while on the northern part, that is to say, in the Lake Superior direction, they are covered in *discordant stratification*, as in North Carolina, by the *Triassic strata* of the Lake Superior sandstone formation. Taconic strata exist also on the northern shore of Lake Superior, especially near the Pic and

Gros Cap, where slates are found intercalated between granite and gneiss rocks.

Farther west, in the Black Hills of Nebraska, Dr. Hayden has recognized the Primordial fauna in a series of sandstone rocks, resting on slates, mica-schists, and azoic rocks. Dr. Ferdinand Roemer, in his exploration of Texas (*Die Kreidebildungen von Texas und ihre organischen Einschlüsse* Bonn, 1852), has described trilobites from the San Sabaz, which M. Barrandé refers to the Primordial fauna; and Dr. B. F. Shumard has since discovered in the same region of Texas, trilobites of the genus *Arionellus*, *Lingulæ*, *Obolus*, and *Orthis*, which leave no doubt of the existence of the Taconic system in Texas (*Trans. of the Acad. of St. Louis*, p. 673, 1860). Even from the small notice of Dr. Shumard, it appears that the Primordial fauna of Texas is almost identical with the one just discovered in the Cantabrian Chain of Spain by Casiano de Prado, (*Bull. de la Soc. Géol. de France*, p. 516, vol. XVII., 1860).

Dr. A. A. Gould presented the following descriptions of new shells collected by the North Pacific Exploring Expedition:—

MANGELIA SEMIASSA. T. rhomboideo-fusififormis, crassa, nitida, albida anticè livida, 8-plicata et striis exilissimis volventibus insculpta; anfr. 6 angulatis; suturâ impressâ: apertura $\frac{1}{2}$ totius longitudinis, pyriformis, anticè acuminata; labro simplici incrassato; sinu vix notato; columellâ rectâ, lividâ. Axis 8; diam. 3 millim. Inhabits —?

MANGELIA TETRAGONA. T. acicularis, turrata, quadrangularis, (angulis compressis), lactea, striis subtilissimis confertis transversis insculpta; anfr. 6 pyramidatis, apicali mamillato: apertura $\frac{1}{2}$ totius longitudinis, satis ampla; labro incrassato posticè angulato. Axis 6; diam. 2 millim. Inhabits China Seas. W. S.

MANGELIA CONCINNA. T. tenuis, elongato-ovata, turrata, nitida, striis exilissimis transversis insculpta, straminea maculis quadratis ferrugineis juxtâ suturam, deinde vittâ angustâ albâ, denique fasciis et lineis rufescentibus picta; anfr. 8 posticè declivibus, supernis strigatis: apertura $\frac{1}{2}$ totius longitudinis, angusta;

labro tenui; sinu ferè desiderato; columellâ rotundatâ, politâ; canali lato brevissimo. Axis 10; diam. 4 millim. Inhabits Loo Choo. W. S.

OLIVELLA SPRETA. T. parvula, elongato-ovata, livida, strigis flexuosis longitudinalibus flavidis picta: spira admodum elevata; anfr. 4; suturâ canaliculatâ: apertura $\frac{2}{3}$ totius longitudinis citò dilatata; columellâ plicis eminentibus bifidis rufis munitâ. Axis 6; diam. 3 millim. Inhabits Hong Kong Harbor, in 10 fathoms, shelly sand. W. S.

Most like *O. mutica*, but the pillar lip differs.

Genus ÆSOPUS. Animal albidum; soleâ anticè emarginatâ, posticè obtusâ operculum corneum flabelliforme gerente; capite parvo; vibraculis curtis obtusis; oculis externis medianis; siphone lato, brevissimo. Testa fusiformis, gibbosa, anticè latè truncata; aperturâ lunatâ, angulo postico callo impleto; columellâ simplici vitreo indutâ; suturâ propè aperturam abnormaliter arcuatâ.

The curious curve of the suture near the posterior angle of the aperture, as if it had been drawn backward, thereby pulling back this angle and curving the last whorl downward, is very peculiar. The form and aspect of the shell, and the structure of the animal, indicate its place to be intermediate between *Mitra* and *Columbella*.

Æ. JAPONICUS. T. parva, solidula, castanea, prope suturam pallescens, striis volventibus incisa; anfr. 7 tumidulis, posticis plicatulis, ultimo ovali, latè truncato, $\frac{1}{3}$ totius long. testæ adequante: apertura lunata; peritremate reflexo; columellâ laminâ vitreâ latâ subrectâ indutâ. Axis 7; diam. 2 millim. Inhabits Kagosima Bay, at 5 fathoms, sandy bottom. W. S.

The only species as yet found, but quite peculiar enough to distinguish it from all other shells.

This very distinct genus, both as to shell and animal, plainly belongs to the family *Amphiperasidæ*, having the form and lip of *Ovula*, while the base is traversed by sharp transverse ridges, as in *Cypræa*, passing over the pillar into the aperture. The broad and short tentacles, the position of the eyes, and the long, obtuse foot of the animal, are quite peculiar.

Genus CRITHE. Animalis discus elongatus, anticè truncatus, angulis vix productis, posticè obtusus; collum dimidiam latitudinis disci, anticè bifurcatum; tentaculis brevibus triangularibus, oculis minutis externis, basalibus. Testa porcellana, convoluta, utrinque rostrata: apertura angusta, arcuata; labro simplici; ventre laminis transversis acutis totus arato.

CRITHE ATOMARIA. T. minutissima, lactea, ovularis, levigata: apertura coarctata, laminis ventralibus ad octo. Axis 0.5; diam. 0.3 millim. Inhabits the China Seas. W. S.

Shell very minute, milk-white, glossy, ovate, somewhat acute at extremities, most so at summit, where there is a delicate groove; aperture very narrow and uniformly so; rostrum short, slightly recurved; ventral laminæ directly transverse, about eight in number, and, as the pass into the aperture, giving the appearance of coarse denticles on the pillar.

This peculiar little shell is the only one of the genus yet observed. The animal is citron-colored, the viscera slate-colored, the eyes reddish black, very small.

PERSICULA TANTILLA. T. minuta, oliviformis, candida, polita: spira occulta: apertura linearis anticè vix dilatata; labro apicem paullo superante, simplici acuto; columellâ plicis obliquis acutis 5 munitâ. Axis 3; lat. 1.5 millim. Inhabits China Seas. W. S.

It has the form of *P. imbricata*.

MARGINELLA (Glabella) LEPIDA. T. minuta, ovato-trigona, tenuis, polita, lactea: spira elevata lateribus concavis; anfr. 3: apertura angusta; sinu posticè parvo; labro incrassato concinnè crenulato; columellâ denticulis acutis 4, postico minimo, et plicâ siphonem circumambiente instructâ. Axis 3; diam. 2 millim. Inhabits China Seas. W. S.

Allied to *M. levis*.

MARGINELLA SEMINULA. T. minuta, ovoidea, polita, tenuis, lactea: spira obtusa, vitro coöperta: apertura antrorsum dilatata, posticè rotundata; labro simplici posticè subsinuato et in plicam posticam columellæ desinente; plicis 4 perobliquis; columellâ nudâ. Axis 4; diam. 3 millim. From a Gorgonia in False Bay, Cape of Good Hope. W. S.

Foot of the animal twice as long as the shell, truncate in front, dilated at sides, lanceolate and carinate posteriorly; mantle not enveloping the shell; tentacles long subulate; eyes lateral near the base of vibracula. The shell belongs to the section *Prunum* of Martini.

VOLVARINA PUELLA. *T. parva*, ovato-cylindracea, subflexuosa, polita, ex eburneo flavescens: spira depresso-conica; anfr. 4, ultimo elongato-ovato; suturâ vitreâ: apertura antrorsum dilatata; labro tenui, inflecto, posticè callo modico suffulto; columellâ 4-plicatâ. Axis 12; diam. 6 millim. Inhabits Simon's Bay, in 18 fathoms, gravelly bottom. W. S.

Resembles *V. zonata*, but is much larger; possibly the shell given by Sowerby as a variety, though no traces of bands are visible. Like *V. tenuata* in form and size, but with a different lip. The animal is very active, of a pale lemon-color, with blotches of flake-white and very numerous crimson points; margin of mantle dark chocolate. Generally like the animal of *Perisicula*.

AMPHIPERAS BULLATUS. *T. tenuis*, ovato-globosa, rubicundula, lineis incrementi et posticè striis volventibus insculpta: apertura linearis; labro angusto vix crenulato, porcellano, utroque pariter producto, posticè canalem contortam obliquam callo circumdatam efformante, anticè unâ cum plicâ columellari canalem brevem angustam definiente.

Closely resembles *A. umbilicatus* and *margarita*, but wants the perforation and triply dentate callus of the former, and is much less acuminate, with a less distinct canal and a denser and more crenulated lip, than the latter.

PLANAXIS INEPTA. *T. minuta*, glabra, ovato-lanceolata, albidolutescens, apice, lineâ subsuturali, et lineis alteris minoribus nigris, posticè et ad basin sulcis cincta; anfr. 8-10 convexis: apertura angusta; labro simplici, tessellato; columellâ modicè excavatâ; callo postico copioso. Axis 4; diam. 2.5 millim. Inhabits Kikaia Bay, at low-water mark. W. S.

Allied to *P. succincta*.

PLANAXIS CINGULATA. *T. parva*, crassa, ovato-turrita, glabra,
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fusco-rufa flavido alternatim zonata, striâ intercurrente; anfr. 7 convexiusculis, apicalibus granulosis, ultimo magno: apertura angustè ovata; labro obliquo intus 7 denticulato et fasciato; columellâ excavatâ, rufâ. Axis 12; diam. 6 millim. Inhabits Ousima, under stones, at low-water mark. W. S.

TURRITELLA GRACILLIMA. *T. parva*, gracillima, acicularis, tenuis, dilutè fulva, fasciâ pallidâ cincta; anfr. 18-20 convexiusculis, filis volventibus tribus et antrorsum nonnullis minoribus sculptis; basi convexo, nitido: apertura circularis. Axis 20; diam. 4 millim. Inhabits Kagosima Bay. Very common. W. S.

One of the most delicate of species, looking like a young shell; but the number of specimens and of the whorls would indicate this as the usual aspect of the shell.

CERITHIUM LACERTINUM. *T. turrata*, fusiformis, tenuis, cinerea fusco maculata; anfr. 10 convexiusculis benè discretis, posticis plicatis et filis granulosis 4 ad anfractum ultimum demum simplicibus cinctis, minoribus plerumque intervenientibus: apertura semilunaris; labro acuto; rostro abbreviato. Axis 13; diam. 4 millim. Inhabits Sydney Harbor. W. S.

Exceedingly like *C. lima*, Brug. It has no varices however, is less slender, and differently colored. It is also like *C. granarium*, Kiener.

CERITHIUM STIGMOSUM. *T. elongato-conica*, albida, granulata, granulis fusciscentibus in seriebus tribus dispositis quorum medianâ ad anfractus anticos bipartitâ; anfr. 8+ convexiusculis, ultimo varicoso: apertura rotundato-ovata; columellâ arcuatâ, callosâ; rostro brevissimo, obliquo. Axis 7; diam. 2+ millim. Inhabits Bonin Is. W. S.

A minute species with the characters of *C. lacteum* and *C. pillosum*.

CERITHIUM PLACIDUM. *T. minuta*, elongata, acutè conica, lactea (apice rufo), crassa; anfr. 11 convexiusculis, filis 5-6 cinctis, posticis plicatis etiam granulatis; suturâ impressâ: apertura $\frac{1}{2}$ totius longitudinis, rotundato-ovata; rostro brevissimo. Axis 8; diam. 2 millim. Inhabits China Seas. W. S.

Another small species of the same group.

BITTIUM CRATICULATUM. T. parva, subulata, fusca, plicis circ. 20 et liris acutis volventibus majoribus 4 supereuntibus alveolata; anfr. 10 ad modum convexis, ultimo varice munito et plicis anticè privato: apertura parva, rhomboideo-ovata, $\frac{1}{4}$ totius longitudinis æquans; rostro brevissimo. Axis 6; diam. 2 millim. Inhabits Hong Kong; laminarian zone. W. S.

Similar to *B. glareosum*, but less slender, the aperture smaller, and the sculpture not beaded.

BITTIUM GLAREOSUM. T. conica, elevata, turrata, leviuscula, dilutè rufa; anfr. 10+ planulatis, filis granulosis 4 cinctis et longitudinaliter ad 20-plicatis, ultimo varicoso et anticè constricto: apertura ovato-rotundata, posticè acuta; labro simplici; columellâ latè arcuatâ. Axis 6; lat. 2 millim. Inhabits Port Lloyd, Bonin Is., and Loo Choo Is. W. S.

BITTIUM PARCUM. T. parva, ovato-turrata, cinerea ad apicem vitrea, undulis ad 10 anticè evanescentibus et filis 6 (ad anfr. ult. 10+), filo minori plerumque interposito, ornata; anfr. 7+ rotundatis, duobus anticis nonconformibus: apertura rotundato-ovata, $\frac{1}{4}$ totius longitudinis æquans; labro vix incrassato; columellâ callo copioso indutâ. Axis 5; diam. 2 millim. Inhabits Loo Choo Is. W. S.

BITTIUM ALUTACEUM. T. parva, elongato-ovata, acuminata, fusca; anfr. 8+ planulatis benè discretis, singulis gemmularum seriebus tribus hic nigris illic corneis instructis, ad anfr. ultimum in liras articulas (filo interjecto) mutatis: apertura subcircularis; canali brevissimo. Axis 7; diam. 3 millim. Inhabits China Seas. W. S.

Much in the style of *C. granarium*, but much smaller. The granules are very distinct and well rounded, being separated by longitudinal furrows.

CERITHIOPSIS LAQUEATA. T. elongato-conica, rufa; anfr. 13+ planatis eleganter bicarinatis; carinis acutissimis, remotis, posticâ majore, alterâ ad peripheriam, quintâ anteriori; interstitiis latis tenuè clathratis; basi planatâ radiatim striolatâ: apertura quadrata; labro a carinis 5-crenato. Axis 8; diam. 2 millim. Inhabits China Seas. W. S.

Most nearly related to *C. assimilata*, C. B. Ad., but its form is more tapering and its posterior keel larger.

CERITHIOPSIS AURANTIACA. T. minuta, ovata, flavido-aurantia; anfr. nucleosis lineis spiralibus et radiantibus decussatis; anfr. normalibus 5 planatis carinatis; carinis quoad spiram duabus validis obtusis haud remotis; alterâ infra peripheriam; alterâ denique circa basin; laminis longitudinalibus circ. 16 carinas decussantibus, tuberculosis; suturâ inconspicuâ: apertura? (fracta). Axis 2; diam. 1+ millim. Inhabits China Seas. W. S.

Resembles *C. pupiformis* from Mazatlan, but differs in the details of sculpture.

CERITHIOPSIS SEMIPICTA. T. minuta, crassa, ovata, albida, bizonata; anfr. 7 bicarinatis, carinis obtusis, tuberculatis, quarum posterior albida, anterior balaustina sunt; tuberculis circ. 16 validis elongatis; carinâ ante peripheriam, alterâ denique ad basin: apertura quadrata? (fracta). Axis 2.5; diam. 1 millim. Inhabits China Seas. W. S.

Resembles *C. sorex* from Mazatlan, except in sculpture.

CERITHIOPSIS RUGOSA. T. turrito-conica, rudis, cinerea; anfr. 12+ carinâ medianâ et alterâ anticali cinctis, interspatio concavo et laminis ad carinas dilatatis clathrato; intervallo postico convexo obversè clathrato; basi lineis incrementalibus solum insculpto; suturâ inconspicuâ: apertura subquadrata; rostro abbreviato; columellâ contortâ. Axis 15 diam. 4 millim. Inhabits China Seas. W. S.

Allied in form and size to *C. terebellum*, *C. metula*, and *C. punctatum*, but very differently sculptured.

TRIFORIS INTERCALARIS. T. alba, subulata; anfr. nucleosis 5, primo lævi ceteris unicarinatis; normalibus 16 planatis, carinis in spirâ cinctis, primum duabus remotis rotundatis, dein alterâ minori intermediâ sensim crescente donec alteris æquante; ad peripheriam denique quartâ; clathris ad 20 carinas decussantibus, intersectionibus tuberculosis; carinis duabus circa basin et canalem parum tuberculosis: apertura parum expansa; canalibus apertis, brevibus. Axis 6; diam. 1.5 millim. Inhabits China Seas. W. S.

TRIFORIS INTERFILATUS. T. conico-cylindrica, dilutè rufo-

fusca; anfr. 10+ bicarinatis; carinis acutis, tertiâ ad suturam; inter carinas leves, totâ superficie clathratâ, clathris radiantibus circ. 30 rotundatis, interstitiis angustis; super clathras, inter carinas spirales, filo parvo spirali; circa basin carinis duabus rotundatis haud clathratis; basi radiatim rugoso: apertura expansa, suborbicularis; labro a carinis 4 et aliis intercalantibus eleganter undato; canalibus apertis, antico elongato, tortuoso, postico brevi, satis profundo. Axis .3; diam. .06+ poll. Inhabits Hong Kong Harbor. W. S.

Resembles *T. corrugatus*, Hinds, but the canal and basal sculpture are different.

TRIFORIS CALCULIFERUS. *T. conico-turrita*, albida, sub-cylindracea; anfr. 12 planulatis, seriebus duabus quasi calculorum tertiâ quoque minore terminali ornatis, interstitiis spiraliter striulatis; carinâ in basi haud tuberculatâ; suturâ inconspicuâ: apertura (fracta)? canalibus clausis, antico tortuoso, postico parvo. Axis 6; diam. 2 millim. Inhabits Loo Choo. W. S.

TRIFORIS CLATHRATUS. *T. dilatato-subulata*, alba; anfr. 9 convexiusculis, carinis spiralibus cinctis, in spirâ 3 (posticâ minore), ad peripheriam quartâ, circa basin duabus minoribus, a clathris circ. 16 decussatis, juncturis gemmatis; suturâ distinctâ: apertura (fracta)? canalibus brevibus, apertis. Axis 4; diam. 1.5 millim. Inhabits China Seas. W. S.

Prof. William B. Rogers presented to the Society, in the name of Mr. Norman Easton, of Fall River, a mass of silicious slate containing the imprints of shells, and gave an account of the discovery of these fossils in some of the pebbles of the conglomerate of that region.

He stated that, some two or three years ago, Mr. Easton had found a fossiliferous pebble on the beach at Fall River, which he at first naturally regarded as a mere fragment of ballast and of no geological importance; but, finding afterward other specimens of like character, not only on the shore but inland at a high level, he concluded that they must have been derived from some of the rocky masses of the neighborhood, and resolved to trace them to their source.

On the river bank, and elsewhere in this vicinity, are many loose boulders, some of them of large dimensions, composed of a very coarse conglomerate similar in aspect to the solid ledges which have their outcrop in Somerset, Dighton, and other tracts toward the North. Sagaciously pursuing the inquiry, Mr. Easton recognized the identity in lithological characters of the fossiliferous fragments with many of the pebbles included in these conglomerate boulders, and at length succeeded in detecting the fossils themselves in some of these imbedded pebbles.

In a visit to the neighborhood early in the summer, Prof. Rogers, in company with Mr. Easton and Mr. Shove, collected specimens from the loose stone heaps and boulders at Fall River, and, on a brief examination of the ledges of conglomerate in Dighton, found similar fossiliferous pebbles in the massive rock in place at that locality.

The fossil forms distinctly recognized in these specimens are *Lingula* of probably two species, resembling *L. prima* and *L. antiqua* of the Potsdam (Primal white) sandstone more nearly than any others with which they have thus far been compared. More perfect specimens and a wider comparison may, however, be necessary to give entire certainty to their determination.

This discovery is obviously but a first, though a most encouraging, step in our inquiries. The question is at once suggested, Where are we to look for the parent rock from which these pebbles were derived? And to answer this it will be necessary to make a thorough examination of the sedimentary masses of adjacent and perhaps somewhat remote regions, of which unfortunately so large a part is concealed by the covering of drift.

The coal measures of Rhode Island and the contiguous parts of Massachusetts have afforded a sufficient number of well-determined fossils to leave no doubt in the minds of geologists as to their general correspondence in period with the great Carboniferous system of this and other countries. But in regard to the age of most of the other rocky masses of Rhode Island and eastern Massachusetts we are yet without the means of forming any definite conclusion. The locality in Braintree in the latter region, signalized by the occurrence of that superb fossil *Paradoxides spinosus* (*Harlani*), presents us with a specimen of one

of the earliest paleozoic formations, but between this and the coal we have as yet been unable to intercalate any one of the vast succession of formations which in the full geological series occupies a place between them.

The original rock from which the lingula-pebbles were derived, whether it shall be brought to light in the neighborhood or may have been buried seaward by an ancient submergence, will most probably connect itself closely in time with the period of the Braintree fossil. But we may hope that further research, aided by the local observation of such zealous inquirers as Mr. Easton, will enable us to supply for this region many other missing records of the paleozoic ages.

As regards the age of the conglomerate rock above referred to, Prof. Rogers remarked that, while it was undoubtedly a part of the Carboniferous series, he did not think that its position in the group had as yet been satisfactorily determined. In some localities it was seen overlying sandstones referable to this series, and could not therefore be regarded as the general floor-rock of these deposits, although probably occupying a low position among them.

Prof. Rogers also made the following communication on the causes which gave rise to the generally elongated form and parallel arrangement of the pebbles.

Referring to the characters of the conglomerate as presented at Purgatory and other places in the vicinity of Newport, and indeed generally throughout its outcrop, he commented on the hypothesis by which it has lately been proposed to explain the elongated form and parallel arrangement of the pebbles in the massive strata of the rock. He described the steep and alternating dips of these thick beds of conglomerate at and near Purgatory, as made apparent by the occasional layers of interposed sandstone, and pointed out the general parallelism there and elsewhere of the flat sides of the pebbles to the planes of deposition, as well as the prevailing uniformity of direction of their longer axes.

He urged that such an arrangement of the pebbles corresponds precisely with the effects of *wave and current action* on water-worn and partially water-borne fragments during their accumula-

tion. The large proportion of pebbles of elongated shape met with in these beds is, he considered, the natural consequence of the mode of disintegration of the original metamorphic rocks from which the pebbles were derived. Such rocks, in virtue of sharply intersecting joints and cleavage planes, are prone in many localities to break up in long, irregular, somewhat rhombic figures, which, by the wearing action of streams and tides, are easily converted into oblong pebbles like those of the Newport conglomerate. Examples of this mode of disintegration are common in the more altered belts of the Appalachian region, especially among the silicious and argillaceous slates along its southeastern border, and may be seen at various points among the similar altered rocks of New England.

To the hypothesis of Prof. Hitchcock that these elongated pebbles owe their peculiar shape and position to the action of powerful pressure upon the strata while the pebbles were in a soft condition from intense heat or other causes, Prof. Rogers urged the following objections.

1. The effect of pressure upon a plastic solid, as shown by Sorby and Tyndal, is in all cases to develop more or less distinct cleavage planes throughout the mass, these planes being uniformly at right angles to the direction of the pressing force. Such an action, applied on a large scale to the strata of conglomerate, must therefore have had the effect not only of flattening the plastic pebbles in a uniform direction, but of developing a cleavage or lamination in them all, parallel to their flat sections as they lie in the mass. But this is so far from being the fact, that we find the cleavage planes of different pebbles running in wholly different directions, sometimes across, sometimes parallel, and sometimes oblique to the general bedding, just as might be expected from the preservation of the original cleavage-structure of the rock from which they were derived.

2. Such a moulding of the pebbles by pressure would either enormously distort or entirely obliterate any fossil forms or impressions which may have existed upon or within the pebbles at the time of their deposit. But an inspection of the *Lingula* from the Taunton River conglomerate, and of a similar fossil found subsequently by Mr. Easton in the conglomerate of Newport,

shows that no such violence could possibly have operated on the mass.

3. While in the localities referred to the *majority* of the pebbles have the oblong shape and parallel arrangement above described, there are many scattered through the mass which are either nearly round or have their longer dimensions more or less transverse or even perpendicular to the general direction. As these could not have escaped the enormous all-pervading softening action and pressure which the hypothesis assumes, their presence in these discordant conditions seems of itself a sufficient refutation of the theory.

In regard to the curved form and close adaptation observed in some of the pebbles, Prof. Rogers thought that accidental peculiarities of shape in the original fragment, and the effects of attrition and the close packing of the accumulated deposit, furnished an adequate explanation both of the bent form sometimes met with and the accurate fitting of the contiguous pebble to the concave surface.

As an example of the formation of flattened pebbles by the action of the shore waves, Prof. Rogers referred to the paving-stones of slaty trap recently imported from Newfoundland, which are remarkable for their very uniform circular outline, their smooth, slightly convex faces, and a thickness rarely exceeding one third of their breadth. If we suppose a great mass of these, as they lie piled along the shore with their broad sides horizontal, to be hereafter cemented together as a stratum of conglomerate rock, would not the argument founded on their shape and position be even stronger than in the case of the Newport conglomerate? Yet nothing is more certain than that they owe their shape and arrangement to the peculiar movement and attrition to which they have been subjected by the action of the waves.

Thus, as regards the Newport rocks and most other conglomerates which had fallen under his notice, Prof. Rogers saw no difficulty in referring the form and arrangement of the pebbles to the familiar agencies above indicated. He does not, however, doubt that in some highly metamorphic districts conglomerate rocks are to be found which have sustained great internal changes through the effects of heat, chemical action, and violent pressure. Such

he has long thought must have been the conditions in some parts of the Blue Ridge and South Mountain Chain in the Middle States, and such perhaps were the influences which operated on the gneissoid conglomerates of the Green Mountains, to which Prof. Hitchcock has referred in his recent communication to the Society.

Prof. Rogers next made some remarks upon the group of rocks constituting the base of the Paleozoic series in the United States.

He stated that the Potsdam sandstone, as exhibited in New York, forms one of a group of deposits which were long since recognized, in the Virginia and Pennsylvania surveys, as forming together the lowest assemblage of formations in this series. These *Primal* rocks, as they have been named in the surveys referred to, begin, where most developed, with a coarse conglomerate, followed by a great mass of grits and slates, and then by the sandstone with *Scolithos* and *Lingulae* corresponding to the Potsdam in New York, and the group terminates above with a formation of argillaceous slate, which toward the southwest has great thickness and a predominance of red coloring.

These several members of the *Primal* series follow each other in a perfectly conformable sequence, resting at their base, more or less discordantly, on the still more ancient metamorphic schists, and other rocky masses, which form the southeastern margin of the Appalachian area. Although no unequivocal marks of fossils have as yet been found lower in the group than the Potsdam sandstone, it is far from impossible that in the less altered portions of the belt the inferior slates and sandstones of the group may disclose distinguishable traces of organized existence.

As the *Primal* series here described, of which the Potsdam sandstone is the chief fossiliferous representative, occupies the base of the Paleozoic series in this country, and the *Primordial* group of Barrande has a like position in Bohemia and other parts of Europe, and as the two are found to agree in certain paleontological features, they may be regarded as geologically correspondent, although not *in their details* necessarily equivalent or contemporaneous.

The red argillaceous portion of the Primal series Prof. Rogers regarded as having its counterpart in the remarkable mass of red argillaceous shales and conglomerates occupying part of the southern shore of Lake Superior. He thought that the occurrence of rocks thus characterized, in direct association with the Potsdam sandstone, in regions where the stratigraphical relations are unequivocal, was a confirmation of the generally accepted opinion as to the age of the Lake Superior cupriferous shales. In the presence of this fact, the argument for the Triassic age of these shales, from their texture and color, is entirely *valueless*. Neither does their cupriferous character furnish evidence, as has been supposed, of their Triassic relationship. Throughout a great extent of the Blue Ridge chain in Virginia, and its prolongation toward the southwest, metallic copper and its ores are of very common occurrence, within and contiguous to the basement rocks of the Paleozoic series. Referring to the systematic tracing of the rocks in question by Foster and Whitney, by Owen, and by the Canadian geologists and others, and considering the clear evidence afforded by the continuity of the deposits as well as the presence at different points of characteristic fossils, Prof. Rogers could see no reason for questioning the conclusion now almost universally accepted by American geologists, that the Lake Superior sandstones and shales belong to the lowest of the paleozoic deposits.

In thus maintaining, in common with nearly all American geologists, that this Primal group of rocks forms the lowest member of the Paleozoic series in the United States,—the lowest group in which any traces of organic life have been discovered,—Prof. Rogers would not be understood as asserting that, in some yet unexplored part of the continent, a still lower group may not be found conformably beneath it. As, however, the extensive explorations along its outcrop in the Appalachian belt, the Canadas, and the Upper Mississippi, and observations in the Rocky Mountains and elsewhere, have shown the Primal group, even where most developed, to be limited to a few thousand feet of strata resting discordantly on the so-called Azoic rocks, it would seem highly improbable that any great downward extension of our Paleozoic series will hereafter be brought to light.

Prof. Rogers exhibited a cast taken from the surface of a block of red sandstone, containing the impressions of bones, apparently of an ornithic character.

The rock was found near the landing at Fort Adams, Newport, along with many others brought there for building purposes. It is stated to have come originally from the quarry in Portland, Conn., and evidently belongs to the Mesozoic sandstone formation of the Connecticut valley. Through the liberal kindness of Capt. George W. Cullum, of the U. S. Top'l Engineers, Prof. Rogers has been allowed to remove the valuable part of the block, which at an early day will be placed in the Cabinet of the Society. The specimen is unique, and it is hoped that, when duly examined, it will help us to a more definite knowledge of some of the animals whose footprints are so abundant in this group of rocks.

Dr. C. T. Jackson said that all the localities referred to by Prof. Rogers were familiar to him, most of them having been carefully examined by him in his public geological surveys.

He had at first regarded the red sandstone of Perry, Maine, as New Red or Triassic, but has since been disposed to consider it Devonian. It should be observed that the Devonian series of rocks were not set apart under that name at the time of the geological survey of Maine, but Dr. Jackson had traced the strata of these red sandstones until he found them resting upon rocks now regarded as Upper Silurian, if not Devonian, at Trescott and at Machias. Fossils recently discovered seemed to indicate that his first conjecture, that these rocks are Triassic, was well founded.

As to the age of the red sandstones of Nova Scotia, they were originally described by Dr. Jackson and Mr. F. Alger as New Red, and from comparison of those rocks with those of Connecticut River, Prof. Hitchcock, from mineralogical resemblances alone, first declared the Connecticut River sandstones to be Triassic.

The Albert coal-mine of New Brunswick was regarded as belonging to the lower Nova Scotia coal-measures, but owing to disconnection of the strata and great disturbance of the rocks, it has been impossible for any geologist to demonstrate their true position stratigraphically. The fossil fishes seem to belong mostly

to the Carboniferous group of rocks, and are of the genus *Paleoniscus*, and similar to those found in the European coal formations; but there are no fossil fishes in the coal-mines of the Joggins in Nova Scotia, and hence no local comparisons could there be made.

As to the geological age of the sandstones of Keweenaw Point, Lake Superior, Dr. Jackson, in his Report to the United States Government in 1849, had presented all the facts and considerations then known, to solve the question, and in his arguments rather favored the idea that they were of Triassic age, and that they were certainly coeval with the sandstones of Nova Scotia, Connecticut River, and New Jersey, as proved by their parallelism on De Beaumont's system, — identity of composition, — mode of disruption, — characters of associated minerals, and, above all, by the fact that they rest upon Devonian limestones, exactly as do those of Maine and Nova Scotia. Still, since some difference of opinion on this subject was known to exist among geologists who had visited Lake Superior, Dr. Jackson, in his geological maps of the copper regions of that country, had simply denoted those rocks as Red Sandstone of Lake Superior.

The discovery of an Orthoceratite at the Copper Falls mine, and of a *Pentamerus* in the underlying limestones of Sturgeon River, absolutely demonstrate that the sandstones of Keweenaw Point are not Potsdam, and the occurrence of pebbles of Pitchstone Porphyry in the conglomerate of Isle Royale indicates, so far as mineral components can be relied upon, that those conglomerates are more recent than those of the Isle of Arran in Scotland, set down as Triassic by Prof. Sedgwick, and now regarded as Devonian.

The strong geological and mineralogical resemblance between the copper regions of Lake Superior and those of Nova Scotia, New Jersey, and Connecticut, cannot fail to strike every one who has compared them. The identity of the concomitant minerals in the amygdaloid and trap breccias, and in the native copper veins of all these localities, proves similarity of conditions in their formation and of the rocks which produced them. Direct comparisons between the Lake Superior sandstones and the copper-bearing sandstones and shales of Germany by Mr. Marcou seem to have set the question of the geological age of these rocks

at rest, at least so far as concerns the copper region of the lake country.

Dr. Jackson said, in so wide an area as the south shore of Lake Superior, hundreds of miles in extent, it is probable that there may be sandstones of a lower series, and he was not disposed to include the Pictured Rocks in the same formation with those of Keweenaw Point and Isle Royale; but thus far no paleontological evidence has been discovered to indicate the geological age of these sandstones, and no one has ever traced out their stratigraphical relations and order of superposition, beyond what was done by Dr. Jackson and his assistants in his public surveys, the wilderness state of that region rendering the work at present impracticable.

Prof. Agassiz reiterated the opinion expressed at the last meeting, that the sandstones of New Brunswick then referred to are Triassic; whether those of Lake Superior are of the same age he was not prepared to say. He thought that in the instances cited by Prof. Rogers the paleontological facts contradicted the stratigraphical relations, but his experience had taught him to place implicit confidence in fossils; and from the examination of these he wished to put on record his opinion that the fossil fishes of the Albert coal belong to a period more recent than all the coal deposits of the Old World, and that the sandstones found in connection with it belong to the Trias and to the New Red.

Prof. Rogers could not admit the Triassic age of the sandstones of the St. Croix in New Brunswick, and the neighboring region of Perry in Maine. These rocks had furnished, at one locality in the latter district, impressions of a plant to which he had formerly called the attention of the Society as closely resembling the *Cyclopteris* (*Sphenopteris*) *Hibernicus*, so characteristic of the Upper Devonian rocks of Scotland and Ireland. Since then he had been confirmed in his opinion as to the affinities of the fossil by the high authority of Prof. Newberry.

As regards the New Brunswick rocks, it cannot be doubted that while most of the belt extending along the northern shore of the Bay of Fundy belongs to Silurian and probably Devonian periods, a large area in the interior is occupied by deposits of

Carboniferous age, which, spreading southeastward around the head of the bay, coalesce with the Carboniferous rocks of Nova Scotia. The group of strata including the asphaltic shales and Albert coal are seen by their stratigraphical relations to form the lowest division of this series. Underlying the gypsiferous shales and limestone, which are succeeded above by the true coal measures of New Brunswick, they occupy precisely the same position as the analogous fossiliferous rocks of Horton and Gaspereau in Nova Scotia, and correspond with the Vespertine group of the Appalachian system. Prof. Rogers illustrated by a section on the blackboard his own observations in regard to the geological place of these rocks, and appealed to the more ample investigations of Prof. Robb and Prof. Dawson to the same effect, showing that so far from being Triassic, these asphaltic fish-beds belong to a period even more ancient than that of the Carboniferous limestone.

Prof. Agassiz invited the members of the Society to be present at the Inauguration of the Zoölogical Museum at Cambridge, on Tuesday, Nov. 13.

Some specimens of *Mallotus villosus* from Labrador were presented by Dr. Bryant.

Prof. Agassiz drew attention to the remarkable difference in the size of the anal fin in the male and female of the *Mallotus villosus*, it being much the larger in the former; this fish was also very interesting to him, as it at one time was supposed to be the only fossil fish identical with living species, an exception to a great paleontological rule; this supposed fossil *Mallotus* he afterward ascertained was taken from a clay-stone of modern formation.

The Corresponding Secretary read letters from Dr. Christopher Johnston, of Baltimore, accepting Corresponding Membership; from the Bavarian Academy and the Verein für Naturkunde at Wiesbaden, acknowledging the reception of the Society's publications.

November 21, 1860.

The President in the Chair.

Dr. A. A. Gould presented the following descriptions of shells collected by the North Pacific Exploring Expedition :

ALABA PUNCTO-STRIATA. T. alba, hyalina, ubique spiraliter tenuissimè striata, striis punctulatis ; anfr. 4 convexiusculis, posticis lævibus, viridioribus, alteris plerumque tervaricosis, varicibus rotundatis niveis : apertura ovata, anticè parum effusa ; labro acuto ; columellâ aurantiaco tinctâ. Axis .18 ; diam. .07 poll. Inhabits Loo Choo Is. W. S.

The generic place of this beautifully transparent and delicately sculptured shell is somewhat doubtful.

RISSOINA TROCHLEARIS. T. parva, crassa, cinerea, ovoidea ; anfr. nucleosis tribus levibus, normalibus 4 convexiusculis, ultimo carinis 7 elevatis acutis cincto, quarum 2-4 (plerumque 3) spiram ascendunt ; interstitiis latè excavatis, sæpè clathratis : apertura ovalis ; peritremate continuo vel in juniorem effuso. Axis .16 ; diam. .073 poll. Inhabits China Seas. W. S.

Resembles *Parthenia exarata* ; and possibly may be a *Rissoa*.

RISSOINA IMBRICATA. T. ovato-lanceolata, porcellana, nitida ; anfr. 8 planulatis, tabulatis, liris imbricantibus numerosis cinctis : apertura ovata, effusa ; peritremate expanso, simplici ; columellâ tortâ. Axis 7 ; diam. 3 millim. Inhabits China Seas. W. S.

RISSOINA FLEXUOSA. T. fusiformis, turrita, straminea ; anfr. 7 convexiusculis, plicis obtusis flexuosis circ. 15 clathratis, et lineis volventibus numerosis cinctis : apertura satis magna, semi-circularis ; peritremate simplici, expanso, anticè effuso. Axis 6 ; diam. 2 millim. Inhabits Sydney Harbor. W. S.

RISSOINA NITIDULA. T. acicularis, vitrea, nitida ; anfr. 9 ad suturam profundè declivibus, plicis inconspicuis ad 18 et filis volventibus circ. 4 insculptis : apertura ovata, vix effusa ; peritremate acuto, filis crenato. Axis 5 ; diam. 2 millim. Inhabits China Seas. W. S.

RISSOINA VILLICA. T. elevato-conica, turrata, alba; anfr. 9 tabulatis, clathris ad 20 obtusis et liris 4-5 sensim antrorsum decrescentibus decussatis. Apertura modica vix anticè sinuosa; peritremate simplici expanso, vix incrassato. Axis 6; diam. 3 millim. Inhabits Loo Choo and Kikaia. W. S.

RISSOINA MODESTA. T. fusiformis, ventricosa, solida, alba; anfr. 9 convexis, sulcis numerosis longitudinalibus minutis et striis volventibus exilibus decussatis; apice acuminato. Apertura obliqua, anticè effusa; peritremate simplici, expanso, incrassato. Axis 5; diam. 2.25 millim. Inhabits Loo Choo. W. S.

RISSOINA STRIGILLATA. T. fusiformis, turrata, vitrea, lactea; anfr. 8. convexiusculis; suturâ profundâ; anfr. ultimo clathris elevatis circ. 22, et costis volventibus sensim remotioribus ad 10 cancellato, et ad decussationes gemmato. Apertura parva, vix effusa; peritremate crenato; sulco postsiphonali profundo, et in rimam umbilicalem producto. Axis 5; diam. 2.20 millim. Inhabits Loo Choo Is. W. S.

This and the three following species, having an acute elevated ridge with an adjacent constriction around the beak, and with a predominance of longitudinal folds, constitute a well-defined subgenus which may be called **RISSOLINA**.

RISSOINA PLICATULA. T. fusiformis, turrata, cinerascens; anfr. 8 + convexiusculis, plicis acutis rectis 15 ornatis, carinam postsiphonalem amplectentibus; interspatiis lineis volventibus insculptis. Apertura ovoidea; peritremate incrassato. Axis 6; diam. 2 millim. Inhabits Port Lloyd, Bonin Is.; Loo Choo Is.; Kikaia. W. S.

RISSOINA LYRATA. T. lanceolata, acuminata, albida; anfr. 10 convexiusculis costas acutas flexuosas circ. 23 gerentibus, ad interspatia striis tenuibus volventibus, insculptis, ultimo dimidiam longitudinis testæ subæquante; costâ basali elevatâ acutâ. Apertura angusta, effusa. Axis 6; diam. 2.5 millim. Inhabits Kikaia and Ousima. W. S.

RISSOINA TORNATILIS. T. subulata, acuminata, straminea; anfr. 9 + convexis, clathris acutis longitudinalibus circ. 22, filis elevatis volventibus 4-5 insignibus. Apertura modica, anticè vix

effusa; peritremate acuto, extus valdè incrassato, crenato. Axis 5.5; diam. 2 millim. Inhabits Loo Choo. W. S.

ALVANIA ACUMINATA. T. gracilis, turrita, straminea; anfr. nucleosis 3 lævibus, dein duobus bicarinatis, denique 4 normalibus, tumidis plicis subacutis et carinis (3) eleganter cancellatis. Apertura ovata; labro tenui; columellâ aurantiaco tinctâ. Axis 3; diam., 1 millim. Inhabits Bonin Is. W. S.

Closely allied to *A. excurvata*, Cpr.

ALVANIA FENESTRATA. T. minuta, conica, lucida; anfr. nucleosis 2 helicoideis; normalibus 4 ventricosis, anticè aurantiacis, posticè albidis, eleganter fenestratis (clathris angustis circ. 15, liris spiralibus 2, quartâ vel quintâ circa basin haud decussatis) interstitiis quadratis, lævibus. Apertura suborbicularis; labro continuo, acuto; columellâ aurantiaco tinctâ. Axis 2; diam. 1 + millim. Inhabits China Seas. W. S.

Broad in proportion to its length, and exquisitely sculptured.

ALVANIA QUADRATA. T. minutissima, alba, lanceolata; anfr. 4 quadratim decussatis, clathris circ. 16, liris spiralibus 3, circa basin tribus additis. Apertura subovalis; labro incrassato. Axis 1.6; diam. .8 millim. Inhabits China Seas. W. S.

The apex is not perfect enough to decide the genus positively, but the aspect is essentially *Alvanoid*.

ALVANIA PURA. T. elongata, acuta, lactea, nitida, clathris circ. 24 et filis volventibus (5-6) decussata, ad anfr. ultimum filis 10 quorum tribus anticis moniliferis et constrictione alteris sejunctis; anfr. 8 convexis. Apertura semicircularis, obliqua, effusa; labro acuto, varice externo suffulto. Axis 6; diam. 2 millim. Inhabits Simoda. W. S.

ALVANIA LIGATA. T. solida, acutè ovata, subperforata, epidermide rufâ induta et carinis circ. 4 (ad anfr. ult. 7) cincta, sulcis concavis sejunctis; anfr. 5 + ventricosis. Apertura rotundato-ovalis, peritremate integro anticè vix sinuato; labro crasso, expanso, carinis dentato, extrorsum varicoso. Axis 4; diam. 1 + millim. Dredged in Hong Kong Harbor. W. S.

Curious for its dusky exterior and prominent keels like a minute *Planaxis*.

ALVANIA FUSCA. T. crassa, ovato-acuminata, rufa, filis volventibus (8) et filis longitudinalibus majoribus (20) cancellata intersectionibus gemmulatis; anfr. 8 convexis, ultimo anticè constricto. Apertura angusta, ovata, effusa; peritremate continuo; labro acuto, extorsum varicoso. Axis 5; diam. 1.5 millim. Dredged in Hong Kong Harbor. W. S.

Resembles the preceding in color, but is more elongated and differently sculptured.

CINGULA (?) ATOMARIA. T. minutissima, solida, conica, flavido-aurantia, apice obtuso; anfr. 5 planulatis, suturis impressis; ultimo ad peripheriam subangulato. Apertura suborbicularis, labro posticè incumbente. Axis 1.5; diam. 1 millim. Inhabits China Seas. W. S.

The apex decides it to be a *Rissoïd*, though its general aspect is that of *Auriculina*, and by the contraction of the aperture it approaches *Nematura*.

OBELISCUS ORNATUS. T. parva, solida, nitida, elongato-conica, exalbida vel carneola, lineâ rufâ postsuturali et striis confertis exilissimis cincta; anfr. 14 planulatis; suturâ canaliculatâ. Apertura rotundato-ovata anticè angulata; columellâ plicâ posticâ et plicâ medianâ inconspicuâ munitâ. Axis 16; diam. 6 millim. Inhabits China Seas. W. S.

Characterized by its numerous whorls and brown thread. It has the form and size of *O. reticulatus*, A. Ad., and if not new, must be a variety of that species.

OBELISCUS BUXEUS. T. crassa, acutè conica, buxea; anfr. 10 planulatis, ultimo ad peripheriam angulato; suturâ profundâ, angulatâ. Apertura subquadrata; labro acuto; columellâ plicâ solitariâ subparietali munitâ. Axis 6.5; diam. 2 millim. Inhabits China Seas. W. S.

Known by its peculiar color and solitary plait.

SYRNOLA SUBULA. T. valdè acuta, solida, polita, alba; anfr. 9 planatis (lineâ rufâ cinctâ?); suturâ impressâ; basi productâ. Apertura ovalis; peritremate continuo; columellâ plicâ unicâ acutâ, declivi instructâ. Axis 4; diam. 1 millim. Inhabits China Seas. W. S.

It has the continuous peritreme of *Eulimella*, and the plait of *Odostomia*. Not uncommon among fossil forms. The genus has recently been established by A. Adams, and may be his *S. cinctella*.

EULIMA CARNEOLA. T. elevata, conica, suvdiaphana, incarnescente nitidissima; anfr. apicalibus 3 stylinis primo globoso, dein 2 conicis, denique 5 planatis; suturâ vix notatâ; basi rotundatâ: labro haud sinuato; labro incrassato. Operculum tenue, parum spirale, aperturam æquans. Axis 4 +; diam. 1.5 millim. Inhabits Ousima. W. S.

An unusually broad conical species of peculiar yellowish flesh color.

ODOSTOMIA BULLULA. T. minuta, ovata, margaritacea, lucida; nucleo parvo, immerso; anfr. 5 tumidis; suturâ impressâ, marginatâ; basi ovatâ, imperforatâ. Apertura rotundato-ovalis; labro haud sinuato; columellâ acutâ, plicâ inconspicuâ, declivi. Axis. 2 +; diam. 1 + millim. Inhabits Loo Choo. W. S.

ODOSTOMIA PLANATA. T. elongata, pyramidalis, tenuis, lactea, polita; nucleo nutante, immerso; anfr. 8 planatis suturâ vix instrictis; basi perforatâ, protractâ. Apertura ovalis; labro posticè sinuato; plicâ columellari conspicuâ, acutâ. Axis 6.5; diam. 2 millim. Inhabits Hong Kong. W. S.

Well marked by its pyramidal form, perforate axis, and close approach to *Obeliscus*.

ODOSTOMIA SUBPLANATA. T. tenuis, elongato-ovata, lævis, flavo-albida; nucleo parvo, laterali, immerso; anfr. 4 vix convexis, tabulatis; basi productâ, imperforatâ. Apertura ovata; labro haud sinuato; plicâ columellari conspicuâ, acutâ. Axis 2.7; diam. 1 + millim. Inhabits Hong Kong. W. S.

Distinguished from the preceding by its less flattened whorls and imperforate column.

ODOSTOMIA LIRATA. T. majuscula, albida, acicularis; nucleo minuto, laterali, effosso; anfr. 6 rotundatis, liris quadratis (5-7) cinctis, interstitiis eleganter clathratis; basi productâ, perforatâ. Apertura ovalis, parum effusa; labro concinnè serrulato; columellâ flexuosâ, vitreâ, plicâ parvâ, obtusâ, parum declivi. Axis 8.5; diam. 4 + millim. Inhabits China Seas. W. S.

This beautifully sculptured shell has the general aspect of *Monoptygma*, but the columellar twist of *Odostomia*.

ODOSTOMIA SCALARINA. T. elongata, acicularis, albida; nucleo parvo, laterali, celato; anfr. 7 tumidis, posticè subangulatis longitudinaliter obliquè clathratis, clathris circ. 18 subcontinuis. Apertura ovata; columellâ tenuissimâ, plicâ inconspicuâ, declivi. Axis 4; diam. 1 + millim. Inhabits Loo Choo. W. S.

ODOSTOMIA OBTUSA. T. oblonga, ovata, crassiuscula, albida; nucleo parvo, dislocato; anfr. 5 convexiusculis, sulcis circ. 8 remotis cinctis, suturâ impressâ. Apertura ovata; labro incrassato; columellâ tenui, plicâ parvâ acutâ. Axis 2 +; diam. 1 millim. Habitat Port Lloyd, Bonin Is. W. S.

ODOSTOMIA VIRIDESCENS. T. minuta, solida, conica, viridans; nucleo celato; anfr. 5, carinis 3 (5 ad anfr. ult.) conspicuis, perobtusis, cinctis, interstitiis angustis. Apertura ovata; labro incrassato; plicâ columellari eminente, peracutâ, transversâ. Axis 3; diam. .7 millim. Inhabits China Seas. W. S.

Remarkable for its pea-green color.

ODOSTOMIA PHYSOIDES. T. solida, lævis, elongato-ovata, alba; nucleo magno, physæformi, trivolti, nutante; anfr. 5 convexiusculis; suturâ impressâ; basi rotundatâ. Apertura ovalis; plicâ columellari erectâ, acutiore. Axis 3 +; diam. 2 millim. Inhabits China Seas. W. S.

Distinguished from other species by its minute physa-like apex.

ODOSTOMIA SOLUTA. T. lanceolata, tenuis, alba, spiralliter tenuissimè striata; apice helicoideo eminente; anfr. 8 convexiusculis, perobliquis, tabulatis; suturâ benè impressâ; basi acuminatâ. Apertura angusta, lunata; labro acuto; plicâ columellari, modicâ, perobliquâ. Axis 4.5; diam. 1 + millim. Inhabits Loo Choo. W. S.

MONOPTYGMA PUNCTICULATA. T. ovato-conica, acuta, lucida, cerea; nucleo satis magno vix nutante; anfr. 7 spiralliter tenuissimè striatis, striis (circ. 7) plerumque minutissimè puncticulatis; basi protractâ. Apertura ovata; labro acuto; plicâ columellari inconspicuâ, obtusâ. Axis 10; diam. 3.5 millim. Inhabits China Seas. W. S.

MONOPTYGMA ACUMINATA. *T. parva*, subulata, tenuis, polita, ex albo viridescens; nucleo laterali; anfr 10, ultimo dimidiam totius longitudinis æquante, subangulari; suturâ lineari, lineâ subsuturali comitante. Apertura angustè ovata; plicâ columellari modicâ. Axis 6; diam. 2 millim. Inhabits Ousima. W. S.

MONOPTYGMA SINUATA. *T. ovato-conica*, tenuis, albida; vertice declivi, celato; anfr. 6 rotundatis, striulis incrementi, et striis volventibus tenuissimis rugulatis. Apertura ovata; labro acuto posticè sinuato; plicâ columellari acutâ, declivi. Axis 18; diam. 4 millim. Inhabits China Seas. W. S.

Has an Odostomoid look, and in growth is like *Limnea truncatula*.

TURBONILLA OBELISCUS. *T. satis magna*, solida, elongata, albida; nucleo trivolvi, lucido, nutante; anfr. 12 planatis, clathris 20-36 obtusis, interdum interruptis ornatis, interstitiis parum impressis antrorsum sensim evanescentibus; basi subglobosâ. Apertura ovato-quadrata; labro tenui; columellâ parum intortâ. Axis 10.5; diam. 3 millim. Inhabits Simon's Bay, at low water, under stones. W. S.

TURBONILLA CELATA. *T. ovato-turrita*, obtusa, solida, alba, nucleo bivolvi, helicoideo, nutante; anfr. 9 planatis, tabulatis, clathris 20-24 rectis plerumque continuis, angustis; interstitiis æquantibus, striis 10-12 spiraliter exaratis; basi rotundatâ minus insculptâ; columellâ valdè intortâ. Axis 6.7; diam. 1.7 millim. Inhabits Hong Kong. W. S.

Well marked by its obtuse point, deep sculpture, and strongly twisted pillar.

TURBONILLA ORNATA. *T. gracilis*, ochracea, fasciâ præsuturali, et basali albidâ cincta; anfr. 8 + planatis, clathris rectis validis obtusis omnino munitis; interstitiis vix æquantibus profundis, striis 10-14 spiraliter insculptis; suturâ impressâ; basi ovatâ. Apertura ovata; columellâ haud valdè intortâ. Axis 6.7; diam. 1.5 millim. Inhabits Hong Kong. W. S.

Similar to *T. interrupta*. Prettily ornamented by its pale base and suture with orange band shading into pink.

CHEMNITZIA IOTA. *T. minima*, gracillima, lactea; nucleo

helicoideo, bivolvi, inclinato; anfr. 6-8 subplanatis, tabulatis, clathris rectis conspicuis 14-16 et striis volventibus (6-10) ad interstitia quadratim omnino decussatis. Apertura ovalis; columellâ vix intortâ. Axis 2 +; diam. .7 millim. Inhabits —? Two somewhat worn specimens vary a good deal in size and form.

CHEMNITZIA CIRCUMDATA. T. ovato-conica, polita, straminea vittâ aurantiacâ cincta; anfr. 8 vix convexis et sutura vix indicatis, posticis plicis numerosis indistinctis ornatis, ultimo haud insculpto et vittis 5 ornato. Apertura angusta; peritremate acuto. Axis 5; diam. 2 millim. Inhabits Sydney Harbor. W. S.

CHEMNITZIA TRACHEALIS. T. pyramidalis, solida, alba; nucleo parvo, valdè declivi; anfr. 8 costis rotundatis validis 4 cinctis, quarum unâ tenuiore sæpè in suturam celatâ; interstitiis omnino tenuissimè clathratis. Apertura ovata; columellâ vix intortâ. Axis 5.7; diam. 1.7 millim. Inhabits Simon's Bay. W. S.

In the deficiency of the columellar fold it differs from the Chemnitzia generally, as well as from Chemnitzia proper, in the absence of bars and in the spiral sculpture. For these peculiarities Mr. P. P. Carpenter* proposes a sub-generic distinction under the name of s. g. **POLYSPIRELLA**. It is intermediate between *Aclis* and *Parthenia*.

DUNKERIA EFFUSA. T. valdè protracta, gracillima, albida; anfr. 10 tumidis, posticis sejunctis, lirulis rectis circ. 30 sæpè confluentibus clathratis, interstitiis tenuissimè decussatis. Apertura ovata; columellâ parum intortâ. Long. 6; lat. 1 + millim. Habitat Loo Choo. W. S.

This elegant little shell connects *Chemnitzia* with *Aclis*, from which it differs in its fine bars and slightly twisted columella.

CÆCUM GRACILE. T. valdè teres, parva, alba, annulis circ. 24, approximatis, subacutis ornata. Apertura haud contracta, nec declivis, annulo crasso cincta; margine laterali subplanato; operculo? Long. 2; diam. .3 millim. Inhabits China Seas. W. S.

* To Mr. Carpenter I am greatly indebted for working out the diagnoses of very many of the smaller shells described in this paper.

The only specimen found is worn and defective, but clearly distinct from any yet described. It is most like *C. pulcherrimum*, but is more slender and has the rings closer. It belongs to the group *Anellum* of Carpenter, the best authority on this genus, and to whom I am obligated for determining this species.

Another species closely resembling *C. elongatum*, but too young and imperfect for description, was obtained. These are the only specimens yet noted from the Japan or China seas, where they seem to be much more rare than in tropical American waters.

HYALA ABNORMIS. T. pupæformis, hyalina, tenuissima, straminea, valdè distorta; nucleo celato, declivi; anfr. 4 nonconformibus, posticis citò crescentibus subangulatis, ultimo cylindrico, elongato anticè contracto; suturâ profundâ, quasi incisâ. Apertura subrotunda, effusa; columellâ plicâ posticè munitâ. Long. 1.7; lat. .6 millim. Inhabits China Sea; coral regions.

This very curious little shell, so remarkable for its short, distorted spire and deep suture, if not a distinct genus, is allied to *Stylifer*, and may for the present be assigned to this genus or to the subgenus *Auriculina*, Gray, which seems to be equivalent to *Jeffreysia* or *Rissoella*, Odostomoid shells without a folded lip; though I think a distinct posterior fold is to be made out in this specimen. The animal alone can settle its true position.

CHELETROPIS GLOBOSA. T. minutissima, pellucida, lævis, tenuissima; nucleo declivo, celato; anfr. 4 tumidis; suturâ perspicuâ. Apertura ovata (?); peritremate continuo; columellâ valdè sinuatâ (forsan plicatâ). Axis 1 +; diam. 8 millim. Inhabits China Seas. W. S.

Two specimens of this very minute shell, quite fresh, were obtained, both having the aperture somewhat fractured. Its generic place is doubtful. The somewhat beak-like prolongation and its tenuity seems to attach it to this genus, which is considered to be a Pteropod. If it does not belong here, it must be allied to the preceding shell.

CARINARIA CORNUCOPIA. T. parva, hyalina, elongata, subtriangularis, compressa, plicis angulatis reclinibus ad cristam retrorsum inclinatis ornata; apice spirali anfractus 4 dextrorsum,

unicum sinistrorsum volventes monstrante; cristâ elevatâ, lunatâ, spiram haud attigente. Apertura angusta, ovata. Long. 10; diam. maj. 5; diam. min. 5 millim. Taken at sea south of the Caroline Is. W. S.

The unusual length of the shell, the very elevated crest, equaling half the major diameter, and the waved, almost plicate surface make this a strongly marked species.

Prof. Rogers presented some fine impressions of fossil shells from an island in Saco River, obtained from a boulder two hundred feet above the level of the sea.

This boulder, if boulder it be, is very large, buried at the base, and crowded with Devonian fossils. The rock is like that at Dennis River, and perhaps there may be an outlying patch at the mouth of Saco River.

Dr. Jackson confirmed the opinion of Prof. Rogers that it is a boulder; he was well acquainted with this region, where a band of this rock crops out on the Aroostook River, to north of Moosehead Lake, from which boulders are scattered even to the outer islands of Penobscot Bay. He observed that this is an exceedingly interesting region to the geologist on account of the extent and perfection of the drift phenomena.

Mr. Marcou exhibited a young growing cactus, the *Cereus giganteus*, from the river Gila.

Prof. Rogers presented the following account of observations on the coiling of the tendrils of the winter squash.

These statements are selected from a number of observations intended to mark the rapidity, force, and other particulars of the coiling movement. They were made during the last ten days of August, 1859, the appearances being noted at 3 P. M. of each successive day while the observation lasted.

1. Aug. 20, 3 P. M. A smooth, round stake, one fifth of an inch in diameter, was planted in contact with the inner side of a tendril, about an inch from its slightly incurved extremity. A similar stake was placed behind, and touching the thick, trailing stem from which the tendril issued, for the purpose of marking

the distance through which the tendril might pull the plant in the progress of coiling. In a few minutes after placing the first stake the end of the tendril was seen to have moved perceptibly towards the stake, but in this case no note was taken of its rate of bending.

Aug. 21. The tendril had made two turns around the stake, and had besides formed two close spires next to it, and two large open ones towards the stem. The plant had been drawn away from the second stake nearly one inch.

Aug. 22. Six close coils had been formed next the first stake, and the same number of open ones towards the stem. The plant had been moved two inches.

Aug. 23. There were eight coils next the stake, wound so tightly as to touch, and eight larger and opener towards the stem. The plant had been pulled away from its first position between two and a half and three inches.

Compared with other like observations, this is an average example of the rate of formation of the coils, and of the force which they exert in moving or bracing the stem.

The form assumed by the tendril is that which would be produced by a coiling force applied in a uniform direction midway on a flexible line with fixed ends; that is, the number of turns is the same for the outer and the inner half of the tendril, but the direction is opposite, making the one a dextral and the other a sinistral spiral, and leaving between the two a comparatively straight space or a loop at which the transition occurs. Where two or three such pairs of coils are formed in the same tendril, as sometimes happens, the aggregate of the right hand turns is still always the same as that of the sinistral.

2. One extremity of a short thread was tied around the curving end of a young tendril, and the other fastened to a stake. On the following day the tendril was found to have made one close turn around the thread, and after this it formed itself into a coil of several turns, all in one direction, the thread being twisted to correspond with the opposite spiral.

3. As in the preceding cases the whole length of the tendril shared in the coiling movement, it became interesting to determine if any one section of it when fixed at the ends would act in the same way.

With this view a long tendril was bent at an angle of 60 degrees around a stake placed midway in length, and was confined in this position by a second stake placed near its curving end, and in contact with the opposite surface.

Soon after this adjustment was made the free curved extremity began to close upon the stake. In twenty-four hours this end had made two and a half turns around the stake, and the portion between the two stakes had begun to twist, but no spire had yet formed. The day following it showed an imperfect open spire, and on the third day it had formed two strong coils adjoining each of the stakes, the turns as before being oppositely directed, and having a nearly straight segment between them.

4. In many cases the motion of the curving end of the tendril was sufficiently rapid to carry it through a sensible angle in the first five or ten minutes. Even when the tendril appeared quite unimpressible when thus watched, it was usually found by the next day to have moved through a considerable space. This capacity of motion would seem to be greatest at a particular stage of growth and afterwards to decline.

The following experiment exemplifies the great activity of the tendril in favorable circumstances :

A tendril four inches long, which had bent itself into a wide hook at the free end, was brought in contact by its concave surface with a smooth, round stake, leaving about three-fourths inch of the outer part of the hook projecting on one side. The coiling action began at once, and could easily be followed by the eye. In fifteen minutes the outer part of the hook had worked through half a circle, and the stake was clasped in a close coil.

OBSERVATIONS ON THE HABITS OF A SPECIES OF HORNET
(*Vespa*), WHICH BUILDS ITS NEST IN THE GROUND. BY
PROF. JEFFRIES WYMAN.

The colony of hornets which is the subject of the following observations, was first noticed towards the end of August, while they were making a nest in the slope of a bank in Cambridge. The process of excavation was still going on, as was obvious from the fact that each worker came out with a pellet of earth in its jaws. As long as they were not interfered with they allowed any one to approach quite near to the nest and watch their movements

unmolested. The earth which they brought out was always carried to a considerable distance. On leaving the nest they generally rose eight or ten feet in the air, and on running beneath them and watching them till they were lost sight of, which was usually at the distance of one or two hundred feet from the nest, they were never seen to drop their load. The earth was not carried in any particular direction, but to all points of the compass. Sometimes they brought out a heavier load than they could rise with on the wing; when this was the case, after making several ineffectual efforts to fly away, they always carried it back again into the hole. When there was a strong wind they were frequently blown into the grass, from which they found it difficult to disengage themselves, but under such circumstances they never abandoned their load.

The number of arrivals and departures at the entrance was sometimes only five in a minute, and at others as many as forty-five. The rain did not materially interfere with their work. Occasionally those going in opposite directions near the nest met in the air, when the one going out was almost always knocked down by the one returning, the first having the disadvantage of just starting as well as the incumbance of a load.

Some sugar which was placed near the entrance was not touched by them, and was eventually carried away by the ants, who were not molested. Fruit was also left without being eaten by the hornets. Insects thrown down near the hole were at once seized and carried in. A dragon-fly, which after several attempts proved too heavy for one of them to move, was cut in two by a few strokes of the jaws, and the hinder part of the abdomen carried off.

Death was an occasional visitor among the larvæ, for their dead bodies were frequently brought out, and like the loads of earth, were carried off to a long distance.

Sometimes one, and at others four or five, stood at the entrance, performing no work nor moving about, but keeping their wings constantly vibrating. The object of this did not appear. The bees have a somewhat similar habit for ventilating their hives, but then a much larger number are associated for the purpose.

When the entrance to the excavation was accidentally injured it was repaired, or if an additional opening was made, it was

walled up. If a small one, only a single worker was occupied on it at the same time. Such a hole, which had been nearly walled up, was reopened by one of their number, the newly made barrier broken down, and the materials scattered about, for no obvious reason.

On the 21st of September, during a storm, the walls at the entrance of the excavation fell in, exposing the top of the nest, which was about three inches below the inlet. Five or six workers at once commenced repairing the injury with material brought from the excavation. Each builder, as he came out with a pellet of earth in his mouth, walked about in different directions, seeming to hesitate where to begin. At length having determined upon a place, the earth was passed from the jaws to the fore pair of legs, and there held while successive portions were bitten off and fitted into place by the jaws. A sharp ridge was first constructed on the borders of the entrance, and gradually strengthened by additions to its sides. A net-work of ridges was built outside of this, and the interstices gradually filled up.

While performing their tasks the workers were trodden upon and most unceremoniously walked over by the others as they came and went, but of all this they took no notice, and continued at their labor as if unconscious of the presence of others.

On the 25th the repairs were completed, and an opening which would have admitted four fingers was so far contracted as to be large enough to admit only one. The nest which had been previously in sight through the entrance, soon disappeared from view, and, as was afterwards shown, was undermined, and sunk several inches deeper.

Oct. 5th. Some specimens were caught for preservation in alcohol. Previously I had peered into the hole each day without molestation. They had crawled over my clothes and hands, but had shown no disposition to sting. After a few had been captured their temper began to change. Instead of flying in a direct line, as they were ordinarily accustomed to do on leaving the hole, they would when irritated move for a few seconds in a zigzag course, making a louder sound than usual, and then charge with force against some part of the body. One of them which stung the finger, as it forced itself away tore off the sting and the poison bag, which were left behind fastened in the wound.

Oct. 12th. Early in the morning some ether was poured into the hole, and the entrance closed until they were all insensible. A few only had gone abroad, and these were captured one by one as they returned. On opening the cavity containing the nest, the excavation was found to be a cylindrical pit about one foot in depth and seven or eight inches in diameter. The nest was not suspended, as is the case with that of an analogous species in Europe, nor was there any evidence that it had been, but rested on the bottom of the pit. It was five inches in its vertical and six in its transverse diameter, and of a nearly spherical form. It had an outer covering of paper, as in the case of the hornets building under the eaves of houses or on trees, but was much more frail, and could scarcely be touched without breaking to pieces. The covering was not arranged in concentric layers, as in the nest of the other species, but consisted of numerous convex scales or plates which overlapped each other and adhered by the edges. Several stones were embedded in the walls. These had been set free during the process of excavation, and as they were too heavy to be removed, had fallen to the bottom, and were eventually built into the walls of the nest as it was finished below.

The combs consisted of four stories, each suspended by several pillars from the one above it, and the first from the roof of the nest. As in the more common species, the edges were not in any instance attached to the walls. The three upper combs contained cells measuring about 0.17 of an inch in diameter; but those in the fourth and lowest, therefore the last built, were much larger and deeper, varying from 0.21 to 0.23 of an inch in diameter. These were for the use of female larvæ and pupæ, while the others contained those of males and workers. The larger portion of the cells for the females had been used, and others were still occupied by pupæ, and the entrances were still sealed up. Those which had been occupied had deposits of animal matter at the bottom of them. Five queen cells were still occupied.

The adult population of the nest was nearly as follows:

Queens, or females	24
Males	236
Neuters, or workers	388
	<hr/>
Total	648

There were also between one and two hundred larvæ.

	inch.	Average weight,	grains.
The length of the females	0.82	3.90	
“ “ males	0.70	“	1.68
“ “ neuters	0.50	“	0.87

When placed in alcohol the males all floated, but the females and neuters sank to the bottom.

Females. The top of the head and eyes are black; a narrow yellow stripe descends along the sides of the head, behind the eyes as far as the base of the jaws; the forehead is yellow, as also the clypeus and jaws, these last being bordered with black; the base of each antenna is surrounded by black; a yellow spot, rounded above and pointed below, occupies the emargination of each eye, its point ending near the base of the antenna. On the middle of the face a vertical black stripe extends from the forehead on to the clypeus, and on either side of the lower end of it is a black dot. The whole face is covered with hairs, those on the top of the head are black and long, the others shorter and of the color of the surface on which they rest.

There are three ocelli on the top of the head, forming a triangle with the apex forwards.

The antennæ have thirteen joints; * the first is short, the second is long, and both are hairy. The end of the antenna is club-shaped. The jaws are quadrangular and bordered with black; the cutting edge is obliquely truncated, three-toothed, the teeth confined to the hinder half of the edge, and the hinder angle being the most prominent.

The maxillary palpi are six jointed.

The lip consists of three parts; the middle broadest, bilobed at its free end; the lateral pieces are much more slender, and separated from the middle one by a deep cleft. There is a dark spot (glandular?) on each lobe of the middle piece, and on the end of each lateral piece. The labial palpi are four jointed, the points longer and more slender than those of the maxillary palpi.

* Westwood states that in the Vespidae, the antennæ have twelve joints in the females and neuters and thirteen in the males; by reference to his figures it appears that he has overlooked the basal joint, which is very small and imbedded in the surface of the face. See *Introd. to Modern Classif. of Insects*. Vol. ii. p. 244. London: 1840.

The terminal joints and outer base of maxillæ are hairy, as also the base of the lip and the basilar joint of its palpi.

The thorax is black; an oblique yellow stripe commences on each side of the back, near the base of the wing, and the two converging meet near the head; the meso- and meta-thorax have each a pair of yellow spots of a somewhat triangular shape; there is also a triangular spot on the side of the thorax under each wing.

Abdomen. The segments are yellow and somewhat differently bordered with black on their anterior edge. In the middle of the first segment a broad triangular black spot is united by a narrow neck to the middle of the black border. In the second the border extends backwards in a triangular form across nearly the whole breadth of the segment; in the succeeding segments this projection is represented by a narrower and more pointed one. Each segment has a pair of nearly square black spots, which are much smaller near the last segment.

The legs are yellow, with the exception of the coxæ and base of the femora, which are black, as also the anterior border of the femora of the first pair of legs.

Neuters. The head is the same as in the females. Antennæ have thirteen joints. Thorax as in the female. The black bands of the abdomen are much broader on the back, covering nearly the whole breadth of the segment, and have each three projections, one median and two lateral, but not very strongly marked; these correspond with the central projections and the pair of black spots of the female. The black bands are not so broad on the abdomen as on the back.

Males. Head proportionally much smaller, jaws less powerful, and the abdomen more slender than in either of the preceding. A small black spot exists on the forehead, but none on the clypeus; in other respects the distribution of the yellow and the black markings is nearly the same as in the neuters.

The antennæ are fourteen jointed; the first and second joints are hairy; the second has a yellow spot on its base.

The external markings on the females and neuters, especially those of the face, are liable to some variation in different individuals. The middle stripe of the face may be continued on either side, so as to unite with the lateral dots, thus forming an inverted T shaped mark; or the stripe may become nearly

obsolete and reduced to a point, and this with the other two dots forming a triangle.

Although there are transitions from one of these varieties to the other, yet the whole series of females and neuters is divided into the three groups according to the types of markings just described, and it is interesting to notice that those on the face correspond very nearly with the more ordinary markings of some of the other species; the first, for example, with those of *V. vulgaris*; the second, with those of *V. Germanica*; and those of the third, with the markings of *V. arborea*.

The species here noticed does not appear to have been described; certainly it does not agree with either of the European species of similar habits described by Saussure in his admirable monograph. As he is about publishing a memoir on the North American Hymenoptera, with an abundance of materials, it is hardly worth while to do anything more at present than to offer general remarks.

A comparison of the habits of the European and American wasps shows the existence of two distinct groups both in the Old and in the New World; one group constructing their nests in the trees, or suspending them from the eaves of houses, and the other making them in the ground. Those having the latter habit, are the *Vespa vulgaris*, *V. Germanica*, and *V. rufa*. The details of the construction of the two kinds of nests seem to be widely different; those hanging free in the air are usually provided with an envelope composed of concentric layers of paper, the outer ones being somewhat irregular. The only description of those of the second group which is given by Reaumur, and copied by all subsequent writers, represents the envelope as made up of irregular pieces of paper, these being in the form of a bivalve shell and fastened to each other by their edges, and overlapping in an imbricated manner like tiles. The nest which I have here described corresponds very well with Reaumur's description, which relates to that of *V. Germanica*, except that the paper in the American nest is much more brittle, and has not sufficient tenacity to allow of its being handled without falling to pieces.

The American species also resembles one at least of those of Europe, in the habit which it has of carrying away the earth

brought from its excavation, (see Westwood, *Introd. to Classif. of Insects*, vol. ii. p. 247.)

The few experiments which I made show their carnivorous propensities, but do not manifest the same tendencies to eat sugar and fruits which are said to be so common in the species of Europe.

At the end of the autumn, a large number of larvæ still remained, as well as a few pupæ of females, which have not yet matured. These now remain in a state of hybernation, and will be preserved until the next spring, to await the effect of warm weather. The pupæ of the species whose habits have been heretofore described are all supposed to come to maturity in the autumn; while the queens in their perfect condition alone survive the winter to begin a new colony in the spring.

Dr. C. T. Jackson announced that the andalusite macle, alluded to at a previous meeting as occurring at Boar's Head and the White Mountains, has been found at the intermediate position of South Berwick, Maine.

A halcyonoid polyp of the family *Gorgonidae*, taken in eighty fathoms of water, in the Bay of Fundy, thirty miles southeast of Mount Desert, was presented by Mr. Lemuel Moore, of West Trenton, Maine.

The polyp was living when it was taken from the water, and it required considerable force to detach it from the bottom; other specimens were obtained at the same time. This is the first time that anything like this has been noticed on the American coast, at any rate in that latitude.

Dr. Horace Richardson and Hugh Montgomery, Esq., of Boston, were elected Resident Members of the Society.

December 5, 1860.

The President in the Chair.

Prof. W. B. Rogers made some remarks on the paleozoic rocks of Dennis River in Maine, as compared with those of certain parts of Nova Scotia recently described by Prof. Dawson in the supplement to the Acadian Geology.

Among the specimens from the former locality, Prof. Rogers had found *Calymene Blumenbachii*, *Discina tenuilamellata*, *Cornulites flexuosus*, *Tentaculites distans*, *Atrypa reticularis*, an *Avicula* apparently identical with *A. Honeymani*, and a *Chonetes*, closely resembling *C. Nova Scotica*, all of which are mentioned by Prof. Dawson as occurring in the rocks at Arisaig and New Canaan, in Nova Scotia. Along with these forms are *Beyrichia lata*, *Spirifer sulcatus*, *Leptæna rugosa*, *Orthis elegantula*, *Modiolopsis ovatus*, and others, the whole constituting a group suggestive of an Upper Silurian age. As the specimens at this locality are mostly in the condition of casts more or less distorted by cleavage, some of the above identifications may hereafter require correction, but enough is clearly made out to show the near correspondence of these Silurian groups of Maine with those of Nova Scotia.

Viewing the different localities in connection with one another, and with the recently discovered Trilobite beds of Eastern Massachusetts and Newfoundland, it would seem probable that we have here parts of an extensive paleozoic area, of which the greater portion is submerged beneath the adjacent expanse of the Atlantic.

Prof. W. B. Rogers commented on the view recently put forth by M. Barrande in regard to the existence of a primordial fossiliferous group in North America extending through a great thickness of strata below the Potsdam sandstone, and on the re-

vival in this connection of the Taconic system of Prof. Emmons. He expressed the highest admiration for the labors of M. Barrande in paleozoic geology, but felt sure that a more complete knowledge of the conditions in which our lower fossiliferous rocks occur would lead him to a different conclusion.

In considering this subject, it is important to bear in mind that no question is made as to the *existence* in this country of what M. Barrande would designate as his primordial series. This is already recognized in the Potsdam or Primal group of our American geology. But the evidence of observations covering the whole margin of the Appalachians, and ranging through Canada, the Northwestern States, and the prolonged outcrop in the Black Hills and Rocky Mountains, has concurred in proving that this primordial fossiliferous group is not extended downward as claimed by M. Barrande, but that it rests *discordantly* either on Plutonic rocks or on ancient metamorphic schists in which hitherto no unequivocal fossil forms have been discovered. As this Potsdam group throughout most of its outcrop is confined to a thickness of a few hundred feet, and even where most expanded does not exceed two or three thousand, there appears to be no reason for considering the primordial series as extending farther below the Potsdam sandstone proper than the same restricted limits.

Adopting the Taconic theory as formerly maintained by Prof. Emmons, the Potsdam group would be *included*, from the oldest system of fossiliferous rocks, and the latter would have to be sought in the rocky masses on which the Potsdam is seen to have been discordantly deposited. This severance of the Potsdam group from these subjacent rocks is, however, not the view suggested by M. Barrande, and maintained by Mr. Marcou in his recent communications to the Society. On the contrary, they propose to leap over the great stratigraphical break which separates them, and to unite the Potsdam group with these older supposed fossiliferous rocks into a single system, the American equivalent of the primordial series of Europe.

Were we assured of the occurrence of a Primordial fauna in these discordantly subjacent rocks, we might with reason claim to unite them with the Potsdam into a single paleozoic system as here proposed. But until this downward extension of the primordial fossils has been unequivocally proved, the universality of the

stratigraphical break between the two sets of strata must furnish the strongest presumption that they appertain to *distinct geological systems*. In maintaining this as the natural inference from the facts, it is by no means intended to imply that the subjacent so-called azoic rocks have from the beginning contained no traces of organic life, or even that in the progress of research distinguishable fossils may not be discovered in some of their divisions. But, judging by the usual law which associates great changes of fauna with great and wide-spread discordance of stratification, it would seem most probable that the organic forms, should such be found in these underlying rocks, instead of belonging to the Primordial fauna as heretofore defined, would form a separate group equally marked and peculiar, and claiming for itself a distinctive name.

In view of these considerations, and of the facts thus far known, Prof. Rogers could not perceive any valid reason for maintaining that the primordial series of deposits extends in this country below the base of the Primal or Potsdam group. He knew of no satisfactory evidence of the occurrence of fossils of any kind in the rocks found unconformably below this group, notwithstanding the vast extent through which its outcrop had been traced, and he could, therefore, see no ground for the opinion expressed by Mr. Marcou that the Potsdam sandstone is the cover rock "capping a system of 30,000 feet of fossiliferous strata."

Referring to the fossils of primordial character discovered at Georgia and Point Levi, Prof. Rogers alluded to observations which he had made some years ago in Western Vermont, in which he had traced the group of reddish arenaceous and calcareous rocks overlying the characteristic Hudson River strata, northward from the flank of the Snake Mountain to near the Canada line. Although he had not visited the spot in Georgia where the trilobites are found, the uniform and moderate eastern dip in the belt bordering the lake and embracing this locality impressed him with the belief that these trilobite layers are included in regular sequence in this upper group. The observations of Prof. Hall, and the recent sections of Prof. Hitchcock in the Vermont survey, had conducted to the same result. As to the age of the Point Levi rocks and the true place of the fossils contained in the conglomerates, he must rely upon the high authority of Sir Wm. Logan's observations.

In regard to the bearing of this stratigraphical question upon the generalizations of paleontology, Prof. Rogers admitted that the discovery of primordial forms at so high a level would be a remarkable and exceptional phenomenon. Such exceptions, however, have been recognized in a greater or less degree in other parts of the paleozoic column. It should be kept in mind that an induction to be true must be founded on all the facts. We cannot, therefore, accept as an *absolute law* in paleontology the principle that like organic types are excluded from reappearing in a given region after having once, and for a long time, disappeared. Indeed, the doctrine of colonies proposed and admirably illustrated by M. Barrande, in connection with some of the Bohemian rocks, is itself a striking instance of departure from such a law. Nor is it easy to place a limit to the interval of such possible recurrence, in the face of the fact stated by M. Barrande, that in one instance a certain group of fossils makes its appearance in a given stratum, then vanishes, and after the accumulation of *three thousand feet of overlying deposits*, reappears to form part of a great characteristic fauna.

Such a *precursory* appearance of a fauna does not seem in any way more probable than the repetition locally of fossil types, long after the disappearance of the analogous forms which marked a more ancient series of deposits. Emigration, in connection with other considerations mentioned by M. Barrande, would explain the one as readily as the other.

Mr. Marcou explained the Primordial fauna of Bohemia according to Barrande; he admitted the supremacy of stratigraphy, and said that precisely what he wanted in regard to disputed points in the Taconic system, was a section of the country under consideration; with such a section all geologists could judge for themselves, and verify or disprove the assertions in regard to it.

Dr. C. T. Jackson exhibited a specimen of Boghead coal, from Torbanehill, Scotland, containing a fine specimen of *Stigmaria*; this he considers as the underground stem of *Sigillaria*, and the scars of the surface as the marks of buds.

Dr. Pickering remarked that the lateral impressions on this specimen looked to him like those of leaves of some coniferous

tree, like *picca*, resembling the Dammara pine of New Zealand and the Feejee Islands. The coal exhibited may be the product of the resin of this pine, and, if so, might with advantage be compared with the New Zealand gum-copal, which differs somewhat from resin. He did not think the impressions bore any resemblance to those which would be made by roots.

Dr. Jackson also exhibited specimens of coal from the Gulf of Chiriqui, between Costa Rica and Panama, discovered by Dr. John Evans.

It contains about forty per cent. of bituminous matter, with nine per cent. of ash; it is well adapted for steam engines, for the manufacture of gas, and for similar purposes, and, if existing in large quantity, will be of immense value to this region. Judging from the fossils which accompanied the specimens, such as *Cardium*, *Cerithium*, *Arca*, *Natica*, *Mytilus*, and other shells, this coal belongs to the upper Eocene period.

Mr. Marcou observed that all coal hitherto found within the tropics has been Tertiary, and does not belong to the true coal measures; the latter have always been formed and found either in arctic or temperate zones, in swampy regions; during the true Carboniferous deposits the terra firma was found under the tropics.

Dr. C. T. Jackson exhibited a microscope recently made for him by R. B. Tolles, of Canastota, N. Y.

This is the inverted microscope of Prof. J. Lawrence Smith, described by him in the American Journal of Science and Arts, vol. xiv. p. 233, 1852. It is peculiarly adapted for the use of the chemist, the object to be examined being placed above the objective lens, while the tube is inclined at an angle of 45°.

Mr. Verrill exhibited some specimens of minerals.

The first was a piece of tin ore, from Mt. Mica, Paris, Me., and was part of a mass which weighed five pounds; he had also found several smaller specimens, some beautifully crystallized, scattered through the mass of rock constituting the vein; they were generally in contact with albite or quartz.

A second specimen he supposed to be native arsenic, though it

may contain an admixture of other substances; it occurred in a vein about three inches wide, inclosed by felspar, of limited extent, and passing through granite. It was found on the eastern flank of Furlong Mountain in Greenwood, Me. In a neighboring locality he also found the same mineral disseminated through the rock in small masses. At other localities on the same mountains are found beryls of large size, black tourmaline, ilmenite, and black garnets.

A third was a crystal of chrysoberyl, found on a hill near Norway village, Me., in granite associated with large garnets and rose quartz; it was of unusually large size. In regard to the first specimen, Dr. Jackson remarked that it was very interesting, as the localities of tin ores in this country are very few.

A donation of several hundred specimens of shells of the Indo-Pacific fauna, comprising nearly two hundred and fifty species, was announced from the Smithsonian Institution.

Though nearly all the species were already in the Society's Cabinet, these will be valuable for exchanges. The thanks of the Society were voted for the donation.

Mr. Theodore Lyman presented a description of a new star-fish, as follows:

ASTROPHYTON CARYI, Lyman, (n. s.)

Special Marks. Disc very distinctly granulated above, without spines. Finer granulation at the outer side of the mouth-angle and along the edge of the genital slits.

Description of a specimen. Diameter of disc, 35 millim. From outer side of madreporic shield to outer corner of opposite mouth-slit, 16 millim. Width of arm, at base, from 9 millim. to 18 millim. Length of arm, measured along the branches, 116 millim. Distance from outer side of madreporic shield to inner points of mouth papillæ to that between outer corners of mouth-slits, 11:5. Madreporic shield very indistinct, oval, irregular, longer than broad. Teeth, tooth-papillæ and mouth-papillæ stout, regular, conical; about twenty-four in number; those near the outer corners of the mouth-slits rather smaller; most of them are

clustered near the point of the mouth-angle. Arms covered above and on the sides with fine grains, which are grouped near the base of the arm in irregular, vertical ridges; these ridges become more regular and distinct toward the end of the arm, and, on the smaller branches, take the form of a double vertical row of grains; along the middle line of the arm runs a very obscure, narrow furrow, in which the grains are rather more scattered. Under side of the arms covered with a smooth skin, beset with fine, scattered, smooth grains; the joints are indicated by very faint cross lines. Interbrachial spaces above, and brachial spaces between the radial ribs, sprinkled with a few fine grains, like those of the arms, but coarser. The upper and lower surfaces are separated by a raised edge, which is slightly granulated. Radial ribs extending quite to the centre, closely beset with coarse, rounded grains; length to breadth, 17 : 5. Interbrachial spaces below covered with a very smooth skin which is sprinkled with fine, rounded grains. Genital slits bordered, on the side next the interbrachial space, by rows of fine grains. The granulation of the interbrachial space extends to the base of the mouth-angle. Arm-spines hooked, microscopic, the lowest one largest, arranged in two vertical rows; they are abundant on the end twigs, but are not found on the main trunks within the seventh fork from the disc. Tentacle-scales three, sometimes four, and, within the disc commonly two; spiniform like the teeth, but blunter; they extend within the inner end of the interbrachial space. Color, in alcohol, above, light Vandyke brown; interbrachial spaces darker; below, under surface of arm nearly white; interbrachial spaces same as above. A single specimen has been sent from San Francisco by Mr T. G. Cary to the Museum of Comparative Zoölogy.

Astrophyton Caryi is distinguished from *A. eucnemis*, which it resembles, by more regular granulation of the disc, by having blunter tentacle-scales, and by close rows of grains along the edge of the genital slits.

Mr. Norman Easton, of Fall River, was chosen a Corresponding Member of the Society, and Messrs. Rice, Edward Pickering, Richard C. Greenleaf, and Wm. Eliot Lamb, all of Boston, Resident Members.

December 19, 1860.

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

Dr. Brewer exhibited two nests of the humming-bird — one from Massachusetts, the other from Georgia.

It has long been a matter of doubt as to what is the material of which the nest is made. It is soft, white, cottony, homogeneous, and shingled on the outside with lichens; though evidently of vegetable origin, the precise material was not known. In the Massachusetts nest, it proves to be the down which protects the buds of the oak tree in spring, and in this instance of the red oak; in the Georgia nest it was of a coarser character, but probably obtained from a similar Southern oak.

He also exhibited two nests of the summer yellow-bird, one from the island of Grand Manan, the other from Lynn, Mass. The former was made almost entirely of the wool of sheep, many of which are kept on the island; the fabric is strengthened by a few straws. In this State the nest is usually made of soft flaxen fibres of decayed plants, and of cotton and threads; the nest exhibited was composed of the unusual material of the down of the brake.

Mr. C. H. Hitchcock made a communication on the geology of Vermont, chiefly in connection with the Taconic system.

The rocks above and below this system are essentially the same in Eastern Vermont and in New York; the first five or six in the series are exactly the same, commencing with the Laurentian deposits, and others above are a little different; the rock containing the trilobites of the Primordial fauna is the first which does not conform paleontologically to the New York arrangement; from the Lower Silurian to the Hudson River group all are found in Vermont, as also their junction one with the other; over the Hudson River slates at St. Albans, on Lake Champlain, lies the equivalent of the Oneida conglomerate, and over this the trilobitic rock. Emmons considers that there is a fault between this and the rocks to the east, in which Mr. Hitchcock differs from him, finding no

evidence of its existence as far as the geological survey has yet been made ; on the contrary, he finds the junction of the coarse grit and the overlying slates above the Hudson River group perfect. He drew a section from St. Albans, on the lake, eastward, showing the order of superposition of the rocks, which all have a small dip, not more than 20° , and the position in which the trilobites have been found. With regard to the *Olenus* discovered there, Prof. Hall is inclined to consider it as belonging to a new genus of trilobites.

In reply to a question as to the age of the Braintree rock containing *Paradoxides*, Prof. Rogers observed that the only indication was to be derived from the fossils and their comparison with the Primordial fauna of Bohemia. The age could not be certainly pronounced upon, without accepting as a principle in paleontology that fossils determine exactly the age of strata ; this has many exceptions showing that the lines are not always precisely defined. He mentioned several instances in the Appalachian chain and elsewhere, where a mingling of fossils invalidates the law of their strict limitation to determined strata.

Mr. Marcou reiterated his belief in the supremacy of stratigraphy in paleontology. He regarded the instances cited by Prof. Rogers as exceptional, and as what occasionally is found the world over on the edges of a basin, where great disturbance has evidently taken place, mixing together fossils of different strata ; but he denied that similar mixtures are ever found in the middle of a basin.

Dr. C. T. Jackson inquired if the *Paradoxides* of Braintree is the same as the *P. spinosus* of Bohemia.

Mr. Ordway replied that from the examination of a considerable number of specimens, he was satisfied that they are distinct species, and he would soon make to the Society a communication giving his reasons for this opinion.

Prof. Rogers stated that Barrande's means of solving this question were scanty, consisting of a few casts in Paris and some photographs sent by himself. Barrande thinks them the same ; but if this opinion should be reversed on full examination, and the two be ascertained to be distinct species, or still better, strongly marked varieties, it would coincide well with his present views on the origin and modification of species.

A paper for publication in the Society's Journal was received from Prof. James Hall, entitled "Descriptions of New Species of *Crinoidea* and other Fossils from the Carboniferous Rocks of the Mississippi Valley." It was referred to the Committee on Publication.

Dr. C. T. Jackson presented some fossil shells from the coal formation at Chiriqui, which is of Eocene age and apparently equivalent to the Paris basin.

The thickness of this coal is about 73½ feet, of which 30 feet are so near together as to be worked in a single gallery. A broad belt of this coal extends through British Guiana and Costa Rica, the more southern portions having been examined by D'Orbigny, Darwin, Wheelwright and other French and English naturalists; the true coal series, however, has never been discovered in South America. This coal in quality is almost identical with cannel; in specimens analyzed from different localities, the carbon varied from 39 to 43½ per cent., the gas from 41½ to 48½, the water from 5 to 6, the ash from 6½ to 10, and the specific gravity from 1.316 to 1.341. In the elementary analysis of a specimen from Cultivation Creek, we have:

Carbon	. . . . .	68.018
Hydrogen	. . . . .	6.480
Oxygen	. . . . .	17.858
Nitrogen	. . . . .	.855
Sulphur	. . . . .	.189
Ashes	. . . . .	6.600
		<hr/>
		100.000

A microscopic examination of this coal shows that it was formed from cellular and not from exogenous plants. Pope's Island coal resembles some varieties of lignite, but contains bitumen; its odor in burning is like that of amber. This coal burns like the cannel of Scotland, with an abundant yellow flame.

Mr. Robert Chambers, of Edinburgh, was elected a Corresponding Member, and Dr. C. F. Crehore, of Boston, and Mr. J. Haven Emerson, of Cambridge, Resident Members.

DONATIONS TO THE MUSEUM.

October 3, 1860. Several Hindoo skulls; skulls and separated cranial bones for anatomical study; and a finely shaped skull from the battle-field of Waterloo, on whose exterior were traced the lines of demarcation of the phrenological faculties by Spurzheim himself; by Dr. B. J. Jeffries. A specimen of coral (*Madrepora spicifera*) from the East Indies; by Dr. S. Kneeland, Jr.

October 17. The teeth of a ray (*Zygobatis*); by Dr. E. W. Blake. A hog-nosed snake (*Heterodon platyrhinos*), killed in Milton; by Master Fred. A. Gilmore.

November 7. A young salmon from Sebago Lake; by Mr. Walter M. Brackett. Eggs of loons and other marine birds, a large crab, large barnacles from the skin of whales, and specimens of *Mallotus villosus* and *Gasterosteus Cuvieri*, from Labrador; by Dr. H. Bryant. The following helminths, — *Tricocephalus dispar*, from a human subject in Vienna; *Trichina spiralis*, from pectoral muscles of man; *Filaria*, immature, encysted in gluteal muscles of mandrill, which died in menagerie; *Cephalocotylean* worms from large intestine of *Odontaspis griseus*, undescribed; *Agamonema capsularia*, encysted in a coiled condition in the peritoneum of *Lophius Americanus*; *Eustrongylus gigas*, loose in peritoneal cavity of *Phoca vitulina*; *Ascarides* from stomach of *P. vitulina*; worms from pericardial surface of heart of *P. vitulina*; by Dr. J. C. White. *Tænia* from intestine of loon; by Mr. Edes. *Dibothrium latum*, 19½ feet long, from an Irishman in America; by Mr. N. C. Page. Skeleton of a Canada lynx; by Mr. F. L. Lee. The body of a female seal (*P. vitulina*), and a young flamingo; by Mr. J. A. Cutting. Vertebrae of blue fish; by Dr. S. Kneeland, Jr.

November 21. A halcyonoid polyp of the family *Gorgonida*, from the Bay of Fundy; by Mr. Lemuel Moore. A myriapod (*Julus*) from Memphremagog lake; by Mr. C. A. Brown.

December 5. 241 species of shells of the Indo-Pacific fauna; by the Smithsonian Institution. A collection of minerals, chiefly ores of iron, from Nova Scotia; by Mr. George W. Busteed. A large stuffed head of a moose, with fine pair of horns; by Drs. Durkee, Bacon, and Sprague, and Messrs. Binney, Ross, and Rogers.

December 19. Embryonic ray from San Francisco, Cal., probably *Raja oculata* (Girard); by Dr. C. F. Winslow. Cast of the head of a Flathead Indian; by Dr. S. Durkee. A cuttle fish (*Onychoteuthis*) from the Mediterranean; by Mr. Lot Day. A sea swallow (*Dactylopterus volitans*, Cuv.) from New Bedford; by Mr. W. H. Taylor. Specimens of Chinese caterpillar (*Spharria Sinensis*); by Mr. William F. Gragg.

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Conspectus Generum Avium. Auctore C. L. Bonaparte. Tom. 2. 8vo. Lugduni Batavorum, 1857. From Dr. H. Bryant.

Report on the State House Well (Columbus, O.). By J. S. Newberry. 8vo. Pamph. 1860. *From the Author.*

Address before the Essex Agricultural Society. By John L. Russell. 8vo. Pamph. Newburyport, 1860. *From the Author.*

Minnesota: its place among the States. Being the First Annual Report of the Commissioner of Statistics, for the year ending January 1st, 1860. Published by Authority of Law. 8vo. Pamph. pp. 176. Hartford, 1860. *From Dr. S. Kneeland, Jr.*

Chart of Geological Formations. By James Hall. 4to. Folded. Also Key to Chart. 12mo. Boston, 1852. *From Dr. S. Durkee.*

Chicago Sewerage. 8vo. Pamph. 1858.

Report of Sewerage Commissioners of Chicago. 8vo. Pamph. 1860. *From Dr. S. A. Green.*

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Life beneath the Waters. By Arthur M. Edwards. 12mo. N. York, 1860. *From the Author.*

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Über die Wohnsitze der Brachiopoden. Von Prof. Edward Sues. No. 1, 2. 8vo. Pamph. Wien, 1859. *From Dr. A. A. Gould.*

Proceedings of the Twenty-First Annual Meeting of the Vermont Historical Society. By Joseph Torrey. 8vo. Pamph. Burlington, 1860.

Experiments and Inferences in regard to Binocular Vision. By Prof. Wm. B. Rogers. 8vo. Pamph. New Haven, 1860. *From the Author.*

Histoire Naturelle des Oiseaux. Par le Comte de Buffon. 18 vols. 24mo. Paris, 1770-1785. *From Dr. Henry A. Ward.*

Catalogue of Flowering Plants and Ferns of Ohio. By J. S. Newberry, M. D. 8vo. Pamph. Columbus, 1860. *From the Author.*

Edinburgh New Philosophical Journal. Vol. XII. No. 1. July, 1860. 8vo. Edinburgh. *From Prof. H. D. Rogers.*

Catalogue of the Publications of Societies in the Library of the Smithsonian Institution; also of the Lepidoptera of North America; also of the Diptera of North America. *From the Smithsonian Institution.*

Transactions of the Middlesex Agricultural Society for 1860. 8vo. Concord, 1860. *From H. D. Thoreau.*

Synonymy of the Family Cyclades. By Temple Prime. 8vo. Pamph. 1860.

Synonymy of the Species of Cyrenella. By the Same. 8vo. Pamph. Also Description of two species of Genus Batissa. By the Same. 8vo. Pamph. 1859. *From the Author.*

Transactions of the Academy of Science of St. Louis. Vol. I. No. 1. 8vo. 1857.

Boston Journal of Philosophy and Arts. No. 2. 8vo. 1823. *From Dr. B. J. Jeffries.*

Descriptions of New Cretaceous Shells from Texas. By B. F. Shumard, M. D. 8vo. Pamph.

Observations upon the Cretaceous Strata of Texas. By the Same. 8vo. Pamph. *From the Author.*

Observations on the Sea- or Pile-Worms. By Mr. Rousset. 8vo. Pamph. London, 1783.

- On the Correlation of Physical Forces. By W. R. Grove, F.R.S., &c. 8vo. Pamph. London, 1846. *From Dr. B. S. Shaw.*
- Gassies, J. B. Tableau Méthodique et Descriptif des Mollusques Terrestres et d'Eau douce. 8vo. Pamph. Paris, 1849.
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