PROCEEDINGS

OF THE

Boston Society of Natural History.

VOL. X.

1864–1866.

BOSTON.
PRINTED FOR THE SOCIETY.
WILLIAM WOOD & CO., 61 WALKER STREET, NEW YORK.
TRÜBNER & CO., 60 PATERNOSTER ROW, LONDON.
1866.

PUBLISHING COMMITTEE.

BOSTON:
A. A. KINGMAN, 11 CORNHILL.

PROCEEDINGS

OF THE

BOSTON SOCIETY OF NATURAL HISTORY.

TAKEN FROM THE SOCIETY'S RECORDS.

January 6, 1864.

The President in the chair.

Present, fifty-five members.

Mr. F. W. Putnam stated that since the last meeting the Society had lost a valued member in the death of Dr. Richard H. Wheatland of Salem. Dr. Wheatland had always taken an active interest in the operations of the Society, and while connected with the Museum of Comparative Zoölogy, was a constant attendant at its meetings; though, owing to his retiring disposition, he seldom took an active part in their proceedings. By the decease of our member, science has lost an honest and enthusiastic laborer.

Dr. Wheatland's investigations were principally devoted to the Reptiles, and his special study was the development of our native Batrachians. For this purpose he visited all the ponds and ditches in the vicinity of Salem and Cambridge, collected the eggs of our Frogs and Toads, and carefully raised the young in order to observe the changes which they undergo in their development. The collection thus made was placed in the Museum at Cambridge and the Essex Institute at Salem.

Had health and life been spared to him, Dr. Wheatland would have greatly advanced our knowledge of the embryology of this most interesting order of animals by his careful investigations. During his last period of partial health, he visited Buenos Ayres, in the hope of building up his failing strength, and while there contributed many specimens to the collections of Salem, Cambridge and this Society; but, alas for his wishes, both the voyage and the season were adverse to his hopes, and he returned home with health still more impaired, and remained an invalid until his decease. During his long sickness Dr. Wheatland showed a Christian resignation to his fate, and continued cheerfully waiting until he should be called to the home of the God whose works on earth he so much loved, and in whose mercy he had firm faith.

Dr. C. T. Jackson read the following

Notice of the Death of Francis Alger of Boston.

Our late associate, Francis Alger, son of Cyrus Alger, who married Lucy Willis, was born in Bridgewater in this State, March 8, 1807. He had one brother named Cyrus (now dead) and six sisters, five of whom are now living.

Francis, in youth, was not studious, and had only a common school education. His taste for study commenced in 1824, when his attention was first drawn to the science of Mineralogy. To his love for that science he attributed his after progress in general learning and scientific acquirements. One branch of Natural History leads to others, and Francis soon found himself engaged in the study of shells and plants, first the fossils and then their analogues in the living world. He began to collect good scientific books, and his library shows how extensively he entered into the study of other branches of Natural History But it was to his first love, Mineralogy, with its proper physiology, Chemistry, that he devoted his chief attention.

In 1826 his father made a trip to Nova Scotia for the purpose of erecting a furnace for smelting iron ores at Clements, on the Annapolis basin. He took Francis with him, and there the young mineralogist began his field labors by collecting such minerals as occur in the iron ores of Digby Neck and in the trap rocks of Granville. He brought home a small collection of Zeolites, Amethyst, Quartz and Agates, of which he published a list in the Boston Journal of Philosophy and the Arts. He also published a brief description of the Nova Scotia minerals in the American Journal of Science and Arts, Vol. XII., p. 227. In 1827 the project was formed by Mr. Alger and his present biographer to make a full exploration of the Peninsula of Nova Scotia, and to collect, describe and publish an account of all the mineral species there to be found. This they proposed to make a free contribution to science. A joint essay was published in the 14th and 15th volumes of the American Journal of Science in 1827 and 1828–9. A large number of extra copies were obtained and gratuitously distributed to scientific men.

In 1829, Mr. Alger and his friend again visited Nova Scotia, and added many new discoveries to their list, and prepared a revised and enlarged memoir for the American Academy of Sciences. Extra copies being procured were bound up and again largely distributed. In the second joint excursion a schooner was chartered for the voyage and served as a home along the wild coasts of the Bay of Fundy. Though Mr. Alger was always very sea-sick when on the rough waters of the Bay of Fundy, he bore the affliction with great patience, and when on shore worked with the most enthusiastic zeal in exploring for minerals. It was a great pleasure to witness his joy when a new crystal oven in the trap-rocks or brilliantly studded agate ball was broken open, disclosing to view the "flowers of the mineral kingdom." He fairly danced with delight, and thought no labor too severe when such rewards were to be won.

His part in the memoir above named was fairly borne, the work of writing the descriptions being carefully and equally divided.

Soon after the publication of this memoir in the Transactions of the American Academy, Mr. Alger was elected a fellow of that scientific body, and took an active interest in the meetings, occasionally communicating some of his scientific observations.

He was, as already stated, one of the original members of this Society, and has read many valuable communications before it on minerals and geological specimens. For several years he was our Curator of Mineralogy, but the cares of business at last forced him, most reluctantly, to resign that office. He came to our meetings whenever he was able, and always manifested a deep interest in the prosperity of the Society.

Having become interested in the iron and zinc mines of Sussex Co., New Jersey, he made that locality, originally opened to the scientific public by the celebrated naturalist Thomas Nuttall, still more famous for its rare and unique minerals, and spread them broadcast over the mineralogical world. He made excursions very often into the State of New Hampshire, and purchased some of the interesting mines, more for the sake of obtaining specimens of the minerals they produced than from any hope of pecuniary gain. He would never sell any mine without reserving the right to all the fine specimens of crystals that should be got out in mining. Finding that he could not extract and bring home to his cabinet a large beryl of five tons weight which exists in Grafton Co., New Hampshire, he purchased the hill, had the crystal uncovered of rock, and considered it as in his cabinet and one of his specimens.

His zeal, instead of cooling off, seemed constantly to be inflamed, and I never knew the time when his eyes would not sparkle at the sight of a new or beautiful mineral. This undying love for minerals was as strongly manifested but a few weeks anterior to his death as I ever knew it, and on his previous trip to Washington he bought some rare specimens which he had kept in view many years, and at last was able to obtain from the original owner. He knew all the fine specimens existing in most of the private cabinets of the United States, and was always ready to purchase them when they were for sale, in order to enrich his own collection. For years he was in correspondence with Heuland, the great mineral dealer of London, who sent out boxes of specimens to Mr. Alger to select what he wanted, and to sell here or return to him the rest. Thus he went on, always adding valuable specimens of minerals to his cabinet. In New York he met a young man who had a guard-chain made up of fine crystals of gold, every one of them far better than could be found in the cabinets of Europe. He at once bought the chain at a high price, had the crystals carefully removed and added them to his cabinet. He also employed a friend to search all the gold sold in San Francisco for crystals and to purchase them for him.

Thus he formed that valuable cabinet, which remains as a monument of his labors and a rich inheritance to his children. Had he lived I doubt not he would have ultimately given a considerable portion of his collection to this Society — enough at least to fill up the gaps in our series of minerals, for he had an abundance of duplicate specimens, many of which were very fine and would have proved valuable to our collection.

In 1849, Mr. Alger received the honorary degree of A. M. from Harvard University.

Of Mr. Alger's personal character we know that he was a kind-hearted man, a firm friend and a worthy Christian. He was always disposed to apologize for the shortcomings and faults of others, and he never spoke a hard word except of those whom he considered irreclaimably vicious, and such men he loathed, and did not like even to name. Francis Alger's career in this world is now ended. He died in the field of his public duty. He was engaged in the city of Washington in perfecting shrapnel to be employed in restoring the union of our divided States. Exposure to cold and wet weather, with fatigue and neglect of proper personal care of himself, brought on a sudden attack of congestion of the lungs, which terminated in typhoid pneumonia, of which he died in Washington on the 27th of November, 1863, in the 56th year of his age.

His son and a brother hastened to Washington to render him all the service in their power. Physicians of our military hospitals proffered their kind aid, but all was unavailing, and he sunk beneath his disease, having but a few lucid moments and not being fully aware that he was on his death bed.

Mr. Alger's scientific publications are the following:

1. Notes on the Minerals of Nova Scotia, Amer. Journ. Science and Arts, Vol. XII., p. 227, published in 1827. Also, a List of the Minerals brought from Annapolis Basin, published in Bost. Journ. Philosophy and Arts, and reprinted in Vol. XII., p. 176 of the Amer. Journ. Science and Arts.

2. Joint Report on the Mineralogy of Nova Scotia, by Jackson and Alger. Amer. Journ. Science and Arts, Vol. XIV., p. 305, Vol. XV., pp. 132 and 201, from 1827 to 1829.

3. Alger's Phillips' Mineralogy, large duodecimo, pp. 662, published by Ticknor & Fields, Boston, 1844.

4. Zinc Mines of Franklin, N. J. Amer. Journ. Science and Arts, Vol. XLVIII., p. 252.

5. Formula of Masonite. Amer. Journ. Science and Arts, Vol. XLVIII., p. 218. 1845.

6. Notice of Minerals. Amer. Journ. of Science and Arts, New Series, Vol I., pp. 121, 122. 1846.

7. Quartz containing Rutile. Proc. Amer. Association for Adv. Science, and Amer. Journ. Science and Arts, Ser. ii., Vol. X., p. 12. 1850.

8. Description and Figures of Crystals of California Gold. Amer. Journ. Science and Arts, Ser. ii., Vol. X., p. 101.

9. Beaumontite and Lincolnite identical with Heulandite. Proceedings Bost. Soc. Nat. Hist., Oct. 4, 1844; Bost. Journ. Nat. Hist., Vol. IV., p. 422; also in Amer. Journ. Science and Arts, Vol. XIV., p. 233, with figures.

10. Description of Minerals from New Holland. Bost. Journ. Nat. Hist., Vol. III., p. 305; Amer. Journ. Science and Arts, Vol. XXXIX., p. 157. With figures.

11. Notice of New Localities of Minerals. Bost. Journ. Nat. Hist., Vol. V., p. 297; Proc. Bost. Soc. Nat. Hist., Vol. II., p. 87.

12. Algerite, and a New Mineral from Cherokee Co., Georgia. Bost. Journ. Nat. Hist., Vol. VI., pp. 118, 123.

13. Description of Transparent Crystals of Red Oxide of Zinc from Franklin Mines, N. J. Proc. Bost. Soc. Nat. Hist., Vol. VIII., p. 145.

In 1844, Mr. Alger published his edition of Phillips' Mineralogy, a book on which he had labored for years, and which he more than doubled by additions collected from every possible source. It was modestly entitled "Alger's Phillips' Mineralogy." This book was intended for schools and for beginners in the science of Mineralogy, but its merits were such as to secure it a place in the libraries of expert mineralogists, and the edition was soon sold. It was the intention of Mr. Alger to have published another edition of his book greatly enlarged and improved by the addition of new matter, and especially the inedited descriptions of species sent to him by the heirs of the late William Phillips.

Several manuscript volumes of such arranged matter remain among Mr. Alger's papers. In these volumes he had collected the information which had been obtained from time to time since the publication of his first edition, this work being done in the night time, after the close of his active business engagements.

In conclusion Dr. Jackson offered the following Resolutions, which were passed:

Resolved, That the Boston Society of Natural History has learned, with profound sorrow, the death of their late associate and friend, Francis Alger, one of the founders of this Society and for years an efficient Curator in the department of Mineralogy.

Resolved, That this Society recognized in Mr. Alger a true lover of Science, and an active and earnest collaborator, animated with a kindly spirit calculated to win the friendship of all who knew him, and to excite an interest in the branches of science to which he was devoted.

Resolved, That a copy of these resolutions be presented to his bereaved family, with expressions of condolence with them in their irreparable loss.

Mr. W. T. Brigham read the following communication:

On the Adaptation of Wardian Cases to Scientific Observation.

Partly at the suggestion of our Curator of Botany, and partly by the desire to remove from the sphere of a parlor ornament, however beautiful, an instrument of great convenience to the botanist, the following suggestions are offered.

Every one who is known to be interested in such matters, has doubtless been questioned again and again by persons whose love for floral beauties has survived the stifling effects of coal gas and furnace heat, as to the best manner of constructing, of stocking and maintaining the little glazed case which should preserve flowers from these two very dangerous enemies. The references to English books on the subject are generally useless, both from the fact that the authors are professional horticulturists very frequently (an objection from the apparent want of sympathy with those who do not possess the reserve forces of a large conservatory), and also because the lists of plants offered are not to be easily obtained in this country. Even a work which has lately been published in this city on parlor and garden flowers, contains very meagre information of any use to the amateur.

It is this interest which is now felt in these beautiful miniature conservatories, which leads me to hope that climatic and physiological experiments may be made of use to botanists. It may seem that a large hothouse would serve every purpose, but it is not so. Every gardener knows that the *Lycopodium cæsium* will not attain its deepest blue color in more than one out of ten hothouses, while in the parlor, exposed beneath the small glass of a fernery, it becomes deeply cærulean. Plants which with difficulty propagate by cuttings in the greenhouse, can be struck in any properly constructed Wardian Case. I have myself no hothouse, and live in a house where the furnace heat and gas are fatal to the blossoms of even so hardy a house plant as the common Abutilon, yet I can grow the most delicate ferns, flower Camellias, strike cuttings of all bedding plants which can be grown in that way, and be comparatively free from the damping off so common on the best cutting bench.

The facilities for regulating the heat and the moisture, nay, even the kind of air our plants shall breathe, are very great. A Wardian Case may be filled with carbonic acid gas if we wish to try its effects on different ferns or even other plants, and the plants wholly unchanged in their relations to heat and moisture and light, a thing impossible in the clumsily contrived chemical experiments of other days. In this very room might we have cases with climates variable at will to an extent only limited by the duration of our sunlight.

Although at present warmer temperatures are produced, yet, by a modification of the case which I will describe, arctic or sub-arctic regions may be formed for the growth and inspection of alpine vegetation. I wish I could offer more than mere suggestions; my own experiments hardly extend the ground of our knowledge at all, and can only be considered in confirmation perhaps of older observations.

The Wardian Case in its original form was almost air-tight, a construction which can only be endured for a time by ferns and the lower forms of cryptogamic vegetation. Next after the necessary ventilation came the decided improvement of artificial heat, used in the so-called Waltonian Case. And beyond this no improvement has been made, save in the more beautiful form of the little glass palaces.

The essential qualities of a good Wardian Case are these: permeability to light, ventilation and drainage. Size and shape must depend on the class of experiments to be tried. An aquarium makes a very good one, if a hole be bored through the bottom for drainage and a glazed cover be fitted to the top.

For many of the Hepaticæ, mosses and low forms of vegetable life, Florence oil flasks will do very well, but from the narrowness of the neck are inconvenient; and I have found the glass preserve jars now manufactured, with large ground glass stoppers in which is a small perforation for ventilation, most excellent both for ferns and for algæ and other water plants.

The Waltonian Case, as manufactured in England (it is not on sale in this country, I believe), is simply a Wardian Case heated by the flame of a lamp applied to the bottom of a large flat tin boiler, containing perhaps two quarts of water. The inconveniences of a lamp are, however, considerable, and must render gas a more desirable heating agent where it can be obtained.

A still more economical way, where high and constant temperatures are not required, is to place at the bottom of the case a flat zinc box, water-tight, with an aperture to fill it with boiling water and to empty it when cold. For a general plant case this will answer every purpose, especially if the hot water box be placed in sand at one end of the case, to encourage a circulation of the enclosed air. The temperature may be kept at about 70° by two changes of the water each day.

I have constructed a case with this heating apparatus, and find the temperature under perfect control; indeed, by warming one part more than the other, I have had at one time the *Paliurus aculeatus* or Christ's Thorn from the shores of the Dead Sea, the Stone Pine from Italy, Thunbergias from India, with Abutilons, Fuchsias, Epigæas, all doing well and making good growth.

Waltonian Case. I have spoken of the inconvenience of lamps as a source of heat, and should describe a substitute. In a case thirty inches long by fifteen wide, and twenty-two high, the usual proportions, a tin boiler may be placed, twenty-four inches long, eight inches wide and three inches deep, provided with an opening in the top for the supply of water and the escape of steam, also a plug or stop-cock at the side to draw off the water. Through this boiler, near one of the long sides, should run a copper pipe one and one-half inch in diameter, and extending beyond the walls of the case at either end. This tube should be placed near the bottom of the boiler, and at a slight inclination, to secure a current of air. Within this tube is placed a quarter inch gas pipe resting on the bottom, and perforated on the upper side with a row of minute holes for jets. This gas-burner should be but two-thirds the length of the copper tube. Sand must be placed around and above the boiler to preserve and render equable the supply of heat. Ventilators are necessary, both on or below the level of the plants and at the top of the case. With this source of heat and a frequent change of air, almost any orchids or stove plants may be grown successfully.

Arctic Case. To grow the plants of cold climates, I would suggest the following modification, which I believe to be new. The case may be constructed in various ornamental forms, but the essential points are these: at the top and back of the case a box to hold ice; valves between this and the interior of the case to regulate the cold draft; and a recess beneath the plant box to contain trays of Chloride of Calcium, that the dry cold of the mountains may be imitated when necessary. The exposure to the sunlight should be constant, and as complete as possible. Whether by this means we can raise Alpine plants, is, I confess, not yet settled by experiment. I have never made such a case, but hope some one may try it.

With such instruments as these, the naturalist can at once examine the growth of alpine or tropical plants; he can, in his own study, imitate the climate of Brazil and that of Mt. Washington, or, again, by excluding moisture for a season, the deserts of Africa. Our own summers may be lengthened, and the effect on our native plants observed.

One more adaptation to the purposes of scientific observation may be suggested. As vivaria, especially for insects in the larva state, and for many terrestrial and fresh-water molluscs, Wardian Cases offer every facility for observation. Tropical insects, whose eggs are not unfrequently transported to this country, might be reared, and of our own, I have raised the Attacus Luna, the large, green, swallow-tailed moth, which usually in the open air comes out of the chrysalis in June, brought out the perfect insect in March, and kept it alive for more than a week, a most beautiful ornament. The slugs, I am sadly sure, grow well and produce young most prolifically. From one pair accidentally introduced in some moss, I captured and killed some hundreds, in various stages of development, from the almost invisible hair-like worm just born, to those of maturer growth.

Of our native plants, some of those which are best adapted for growth in the common plant cases, are: —

Sarracenia purpurea,— which should be set in a vessel of water.

Epigæa repens. Requires shade, and grows better when almost covered with dead pine leaves.

Monotropa uniflora.

Aphyllon uniflorum.

Goodyera repens, and *pubescens.*

Arethusa bulbosa, — whose delicate stems sometimes support three flowers.

Calopogon pulchellum.

Corallorhiza multiflora.
Utricularia purpurea, and *gibba*. Floats in water.
Of Ferns: —
Polypodium vulgare.
Adiantum pedatum.
Osmunda spectabilis and *cinnamomea*. Both much dwarfed.
Aspidium acrostichoides.
Onoclea sensibilis.
Lygodium scandens.

The native Lycopodia, mosses, &c., generally do well. The *Marchantia polymorpha*, with its curious umbrellas and baskets of eggs, I found some two or three years ago in pots in the Public Garden Conservatory, where the gardener gravely informed me that it was spontaneously produced from Cochituate water, and if the plants were watered from the rain-water cistern they would disappear. I afterwards found the species on the banks of an ice-cold brook in the Dixville Notch; in such extremes of temperature will the lower vegetables thrive.

Of common Greenhouse plants: —
Primula veris.
Veronica Lindleyana.
Justicia purpurea.
Abutilon venustrum.
Fuchsias, Azalias, Camellias in variety.

For a Case with artificial heat: —
Gloxinea.
Achimenes.
Caladium argyribes.
" *Chantinii.*
Gesneria zebrina.
Maranta zebrina.
Croton, of various species.
Collyria.

Of Ferns: —
Pteris argyrea.
" *tricolor.*
" *hastata.*
Adiantum cuneatum.
" *formosum.*
" *venustrum.*
Asplenium trichomanes.
Lycopodium Wildnovii.
" *cæsium.*
" *frondosum.*

Lycopodium apoda.
Blechnum gracile.
Gymnogramma chrysophylla — the golden fern, which does not grow as well in close cases as
Gymnogramma Peruviana — the silver fern.

Complete lists would, I think, nearly exhaust the flora. or at least the plants less than three feet high; as it is, I have mentioned only those interesting and beautiful ones which I have grown myself, or seen in other cases, and offer them to those who desire to combine beauty with scientific use.

Capt. N. E. Atwood addressed the meeting upon the habits and geographical distribution of the common Lobster, in the following words:—

The Lobster is found along our coast in great abundance from the southern point of Cape Cod to the gulf of St. Lawrence. They are caught by the fishermen in vast numbers along the coasts of Maine and Massachusetts, and find a ready sale in Boston and New York markets; from Plymouth northward and eastward they are caught in deep water in the months of February and March, but not in large quantities; as the season advances they come near the shore and remain through the spring, summer and autumn, and are very plentiful; along this range of coast three-quarters at least are males at all seasons of the year. At Cape Cod (Provincetown) their habits differ very much from the lobsters on the north shore; they do not come there until June and remain until October, when they disappear and go to parts unknown. One very singular fact I have noticed is, that the lobsters which visit Cape Cod are nearly all females; they appear to come near the shore for the purpose of depositing their young, after which they pass away and others in turn take their places, as is indicated by the change that is constantly taking place, for when the fishermen are catching great quantities of large, good hard-shell lobsters and they are unusually abundant, perhaps the next day there will be a new kind, smaller and not of so good quality, the former ones having passed away and others come to take their places.

In Boston the number of lobsters sold annually cannot be much short of a million. The male lobster is preferred and is the most salable, as this city has always been supplied from the northern shore of Massachusetts and coast of Maine, where the males are most plentiful. It is a great advantage to the fishermen that the people prefer males; in New York it is very different in this particular, that city being supplied from Cape Cod after June, and the female lobster thus considered much the best. I have sold many lobsters in New York.

and males sell at only about half price; the male is much poorer than the female in meat.

Mr. T. T. Bouvé rose to speak of the financial condition of the Society and its enlarged needs in the new building, and showed that the capital which had hitherto barely supported the Society, would now manifestly be wholly insufficient for its maintenance. In this connection he read a letter recently received from Dr. William J. Walker, to whom the Society is already so largely indebted, wherein he promised to give to the Society another $20,000, on condition that they would raise a like sum, the whole to be funded and used by the Society as a working capital. Mr. Bouvé urged very earnestly that every member of the Society should give his direct personal effort toward the raising of the sum sufficient to secure so generous a donation.

After remarks by Rev. Mr. Waterston, Dr. C. T. Jackson and the President, it was moved by Rev. Mr. Waterston that a committee be appointed to consider and suggest the best method of raising the proposed fund.

Mr. Bouvé remarked that a committee consisting of Prof. Wm. B. Rogers, Dr. C. T. Jackson and himself had already been appointed by the Council for a similar purpose, to report at this meeting of the Society, but that they had been unable as yet to effect anything; he hoped that any committee appointed would call a special meeting to hear their report.

Rev. Mr. Waterston amended his motion by moving that the Council committee, with an addition of three members of the Society, should be appointed as a committee for the purpose indicated, whereupon the motion, being seconded, was passed, and the names of Messrs. Waterston, R. C. Greenleaf and M. D. Ross were proposed and accepted.

Dr. C. T. Jackson moved that the President be added, which motion was passed; and subsequently, on motion of Mr. Bouvé, Drs. A. A. Gould and J. C. White were added; so that the committee as amended consisted of nine, as follows: — Messrs. Bouvé, Rogers, Jackson, Waterston, Greenleaf, Ross, Wyman, Gould and White.

Mr. Bouvé announced that at the next meeting he should propose a change in Section III., Article 2, of the By-Laws, in the substitution of the words "one hundred" for "fifty."

Mr. Charles Stodder exhibited under the microscope specimens of the deep sea soundings referred to him at the meeting of September 16th, 1863.

He stated that the mud was brought up by the Brooks sounding apparatus from a depth of 2280 fathoms, by Capt. José Polo de Bernaleé, of the Spanish corvette Villa de Bilboa, April 28th, 1857, Lat. 0°, 21′, 0″ N., Long. 23°, 28′, 52″ W. (Greenwich). The dry mud is of an ash brown color, of slight firmness,as it readily crumbles to powder in the fingers. Treated with hydrochloric acid it dissolves entirely with the exception of a very few fragments of the siliceous shells of Polycystinæ, and equally few diatoms — *Coscinodiscus profundus*, Ehr. It is an almost pure organic deposit, consisting, with the exceptions mentioned, of calcareous shells of Foraminifera, perfect, with fragments and amorphous powder of the same. An attempt to determine the genera and species of the forms found was unsatisfactory, not having time or disposition to make a thorough study of them. The largest forms which may be readily picked out with a hand lens, are, or approximate to, *Rosalina* and *Rotalia*. The smaller forms either are, or resemble *Globigerina*. The largest forms constitute about twenty-five per centum of the bulk, the powder about the same, the balance being the smaller perfect forms.

This material is identical, in chemical constitution, with the chalk of England, and nearly so in organic contents. Under pressure, together with the lapse of time, it will undoubtedly have the same physical character. Thus it is a reasonable inference that we have in our time, in the profound depths of the ocean, a chalk deposit in the process of formation, and also we may infer that the chalk formation of England and France was deposited under similar conditions.

Mr. S. H. Scudder exhibited a book of bound pamphlets from the library of the Boston Athenæum, which showed the ravages of a small coleopterous insect; the volume was one of a long series, some two hundred in number, of similar volumes, which had always been kept together; about a dozen volumes which, from their similarity, were undoubtedly bound at the same time in sheep treated with potash, so as to have the effect which "tree-marbling" gives to calf, were the only ones which bore any traces whatsoever of the destruction caused by the beetle; the only injury was to the leather binding, the paper being attacked only so far as it seemed to be in the way of the insect; both the sides and the back were undermined in every direction, evidently by a scolytideous larva, and the back frequently riddled with the holes whence the perfect insect had made its escape; the injury done was not of recent date, and no traces of the insect living in any stage were discernible. By the character of its burrows and its mode of attack the insect would appear to be very closely allied to the *Tomicus eruditus* described by Westwood in the Transactions of the Entomological Society of London, Vol. I., p. 34.

T. J. Whittemore, Esq., of New York, was elected a Corresponding Member, and the following gentlemen Resident Members:—Dr. George J. Arnold of Roxbury, Messrs. Frederic Ware, George P. Huntington and Constant P. Davis of Cambridge, and Messrs. Henry Endicott and James B. Francis of Boston.

January 20, 1864.

The President in the chair.

Present, sixty members.

Mr. Alex. Agassiz made a few remarks on the habits of a species of Pteropod (*Spirialis Flemingii?*) which had occurred in great abundance at Nahant during the summer of 1863.* His observations of the habits of these animals agree with those of Rang and Souleyet.

They come to the surface of the water about an hour after dusk; they do not remain long, and after ten o'clock at night were rarely met with. He succeeded only once in finding a few isolated specimens during the heat of the day; while at full tide, soon after dark, they were very often found in abundance. These animals are very easily kept in captivity, and their habits, which can then be carefully watched, may explain in a very satisfactory manner their sudden appearance and disappearance. As was already previously known, these animals can creep about by means of their wing-like appendages. When kept in captivity, it was noticed that they but rarely

* The shell of this Pteropod resembles more S. Flemingii than the Spirialis Gouldii of Stimpson. This is the first time that a living Pteropod of this family has been observed on this coast.

left the bottom during the day, merely rising a few inches and then falling down again to the bottom of the jar. After dark, however, they could all be seen in great activity, moving near the surface of the water as fast as their appendages enabled them. During the day they often remain suspended for hours in the water simply by spreading their wing-like appendages, and then suddenly drop to the bottom on folding them. This habit of remaining at or near the bottom, which they have in common with so many of our marine animals, explains undoubtedly their sudden appearance and disappearance, as they probably only come to the surface in search of food at certain hours. When the animal is in motion, beating the water like a butterfly to propel itself forwards or upwards, the shell is carried at right angles, hanging somewhat obliquely to the direction of the movement. To counterbalance this weight, an exceedingly long and powerful siphon extends on the opposite side of the animal, which is used as a kind of balance wheel; the shell, while the animal is in motion, assuming a totally different position when it is not thus counterbalanced. Mr. Agassiz exhibited at the same time drawings of the animal in different attitudes.

Dr. J. C. White exhibited a skeleton of the Hottentot mounted upon an improved plan, which exhibited all the bones occupying their relative position, while the skeleton is disjointed, each bone being fastened to a board by a hook, thus allowing any bone at pleasure to be taken off and examined; the hands and feet only have their parts connected.

The President added a few remarks in further explanation of what he said at a previous meeting upon the elevation of the orbit in the Hottentot, and its encroachment upon the cerebral cavity.

In reply to a question by Dr. Wyman, Dr. Pickering said that he had seen but five or six living Hottentots, and that he had seen this individual while living; he considered him the least characteristic Hottentot he had known in his lack of departure from other types.

Mr. T. T. Bouvé, in behalf of the Committee appointed to consider and suggest the best mode of operation to raise the $20,000 needed to meet the requirements of Dr. Walker's donations, reported the names of the following persons as a Committee of Subscription:—Prof. Jeffries Wyman, Dr. A. A. Gould, Dr. C. T. Jackson, Prof. W. B. Rogers, Rev. R. C. Waterston, Dr. Samuel Cabot, F. W. Lincoln, Dr. Henry

Bryant, Dr. Charles E. Ware, Dr. D. Humphreys Storer, Geo. B. Emerson, T. T. Bouvé, Dr. S. L. Abbot, M. D. Ross, R. C. Greenleaf, J. D. Philbrick, Ed. Pickering, N. L. Hooper, Lemuel Shaw, C. J. Sprague, Chas. C. Sheafe, J. D. Kidder, Thos. Gaffield, M. S. Scudder, Dr. J. C. White.

He also read a circular which had been prepared by the Committee. The report was accepted and adopted.

The change in the By-Laws, altering the condition of Life-Membership from the payment of $50 to $100, coming up as special business on motion of Mr. Bouvé, after considerable discussion, it was voted that Article 3, Section II., of the By-Laws be amended by the substitution of the words "one hundred" for "fifty."

Mr. Bouvé, for the Committee appointed at the meeting of April 15th, to take into consideration what changes in the Constitution and By-Laws would be advantageous to suit the necessities of the Society on its removal into its new building, asked that that Committee be relieved of duty and a new Committee appointed; this request was granted, and Drs. A. A. Gould and J. C. White and Mr. S. H. Scudder were nominated in their places. Dr. White and Mr. Scudder declining, the names of Messrs. C. J. Sprague and C. Stodder were substituted, and the Committee as thus formed was elected.

The following persons were elected Resident Members:— Messrs. Henry W. Wilson, S. T. Snow and Joshua P. Converse.

February 3, 1864.

Vice President Charles T. Jackson, M. D., in the chair.

Present, forty-seven members.

Prof. J. P. Cooke exhibited specimens of crystallized silver from Lake Superior and of Childrenite from Hebron, Me., and gave some account of the acid tartrates of Cæsium and Rubidium, exhibiting crystals.

Dr. C. T. Jackson presented, in the name of Mr. John R. Robbins, of Lawrence, a specimen of rock salt from the Petit Anse salt mines of Louisiana, and read an account of the discovery and character of these mines.

Dr. J. C. White, in behalf of Dr. Henry Bryant, announced the donation of three hundred and forty-six specimens of two hundred and ninety-six species of mounted birds from the Smithsonian Institution, collected on various government expeditions; also a donation from Dr. Bryant of three hundred specimens of mounted foreign birds from his own collection.

The Subscription Committee announced subscriptions to the working fund to the amount of $4425.

The Secretary announced that he should be absent during the remaining meetings of the official year and requested that a Secretary *pro tempore* be chosen. Dr. J. C. White was unanimously elected.

February 17, 1864.

T. T. Bouvé, Esq., in the chair.

Present, seventeen members.

The Chairman announced the donation of a very valuable collection of fossil Echinoderms from James M. Barnard, Esq. This collection was made by Dr. A. Krantz of Bonn, and is second only to that in the Museum of Comparative Zoölogy in Cambridge in the country, and presents good types of nearly every group in the class of Echinoderms in which the American Museums are deficient, embracing specimens from all the formations from the Silurian upwards. The identifications of the names and localities are complete. The donation included also a small collection of living Echinoderms, dry and in spirits, named by Mr. Alex. Agassiz, a full series of the casts of the Echini in the Museum of Neufchatel, some corals, Mollusca and fifty volumes of works on Natural History. The Echinoderms, fossil and living, number one thousand six hundred and thirty specimens, representing five hundred and forty-six species and one hundred and seventy-two genera.

A special vote of thanks was passed for this valuable addition to the cabinet.

The Corresponding Secretary announced the receipt of the following letters, namely: —

From the Smithsonian Institution, April 3d, June 29th, July 29th, and December 13th, 1863; the K. Physikalisch-Œkonomische Gesellschaft, Königsberg, August 10th, 1863; the Königlich Sächsische Gesellschaft der Wissenschaften, Leipzig, August 22d, 1863; the Société Royale de Zoologie à Amsterdam, August 25th, 1863; the Naturhistorische Gesellschaft zu Nürnberg, September 30th, 1863; the Royal Horticultural Society, South Kensington, October 17th, 1863; the Gesellschaft für Beförderung der gesammten Wissenschaften, Marburg, September 5th, 1863; the Geological Society, London, December 2d, 1863; the Librarian of the University of Toronto, February 8th, 1864; the Trustees of the State Library of New York, Albany, February 1st, 1864, acknowledging the receipt of the Society's publications; the Naturforschende Gesellschaft in Danzig, August 8th, 1863, and the Physikalische Medicinische Gesellschaft in Würzburg, October 17th, 1863, acknowledging the same, and presenting their own publications; the Académie Impériale des Sciences, etc., de Lyon, April 11th, 1863; the Société Impériale d' Agriculture, etc., de Lyon, April 11th, 1863; the Société Royale de Zoologie à Amsterdam, August 25th, 1863; the K. Akademie der Wissenschaften, Wien, August 25th, 1863; the Oberhessische Gesellschaft für Natur- und Heilkunde, Giessen, August 25th, 1863, and the Francisco Carolinum Museum, Linz, October 19th, 1863, presenting their publications; the Verein der Freunde der Naturgeschichte, Meklenbourg, August 28th, 1863, and the Deutsche geologische Gesellschaft, Berlin, November 5th, 1863, acknowledging the receipt of the Society's publications and accepting the proposition for an exchange of publications; and the Verein der Aerzte in Steiermark, Gratz, proposing an exchange of publications; also from Mr. John Brown, Hamilton, Canada West, January 27th, 1864, acknowledging his election as Corresponding Member.

Dr. L. H. Gulick and Mr. J. T. Gulick of Honolulu, Sandwich Islands, were elected corresponding members.

Messrs. N. J. Bradlee, Henry G. Denny, Edward A. Brigham, William H. Dale, William Munroe, Otis Norcross, William L. Richardson, John Hogg, Huntington F. Wolcott, George Sceva and Amos H. Johnson of Boston, and Gardiner G. Hubbard and Benjamin M. Pierce of Cambridge were elected Resident Members.

March 2, 1864.

Mr. C. K. Dillaway in the chair.

Present, fifty-three members.

Mr. Alpheus Hyatt exhibited some peculiar fossils from the island of Anticosti which had been originally described by Mr. Billings under the name of *Beatricea nodulosa* and *B. sulcata*, and considered by him to be of vegetable origin ; they will probably form a new order of Cephalopoda.

Mr. A. E. Verrill exhibited specimens of *Pasceolus Halli* Billings,* which occur in the same formation with *Beatricea* at Ellis Bay, Anticosti.

This fossil was described by Mr. Billings as an *Ascidian*, but some of the specimens collected by the late expedition from Cambridge showed that the exterior was formed by a shell of considerable thickness, composed of small hexagonal and pentagonal plates or prisms, having the outer surface marked with raised radiating lines. Moreover some of the specimens had the lateral openings well preserved, and surrounded by six plates differing in form from the rest. Mr. Verrill had, therefore, considered it as a *Cystidean*. It also agrees with other species of this group in form and appearance.

Mr. W. H. Niles having recently made a more complete study of this fossil was invited by Mr. Verrill to express his opinion upon its relation to the other *Cystideans*.

Mr. Niles remarked that he had so far studied the specimens exhibited as to be convinced that Mr. Verrill was correct in his belief that they were true Cystideans. The species had been described by Billings under the name of *Pasceolus Halli*, but the genus had been previously described by Eichwald under the name of *Cyclocrinites*. The genus belongs to the family *Sphæronitidæ*.

* Canadian Geological Survey. Report for 1853—'56, p. 342.

Mr. Billings had not been alone in his belief that this family had Ascidian affinities. M. Kœnig considered the Cystidians as Ascidian Mollusca, and so far as regards this family, was supported by McCoy. The features mentioned by Mr. Verrill entirely preclude the idea of these fossils being the casts of the interior of Ascidians. The same kind of coverings which Mr. Billings considered as the enclosing sac, sometimes incrusts the Brachiopoda of the same formation.

Mr. Niles referred to the interest these specimens afford to the naturalist, and gave a brief review of their scientific history and of the theories of prominent investigators. He then proceeded to show the cystidian affinities of the species by considering the complication of structure exhibited in the group as a type in geological history. He showed that all the features of the genus Cyclocrinites are, at the same time, embryonic and cystidian, and stated that so far as he knew, this is the only genus of the family yet discovered in America, although the family is well represented in the Palæozoic strata of Europe.

Dr. B. Joy Jeffries exhibited and explained an optical experiment of Prof. Hermann Meyer of Zurich, showing how much our estimation of the distance of objects depends upon the "muscular sense" of the external and internal recti muscles of the eyes.

A series of threads, eight or ten in number, are stretched parallel to each other across a frame about one fourth of an inch apart, and so arranged that the second one is a little nearer and the third still a little nearer the eye, the fourth and fifth further, the sixth and seventh nearer again, and so on in a zigzag. When these are held before the eyes so that the middle one is about upon a level with them and a foot from them, all the threads seem to be in one and the same plane. Reversing the position of the threads so that they are vertical, they at once appear in the several planes of the zigzag in which they truly are.

The explanation is, that we are unable to determine the distance of those objects which we cannot bring the optic axes to bear upon so that they cross each other at the object. This we can do in regard to any *point* on a horizontal line, but the line as such we cannot "fix," it will simply appear nearer and thinner, or further and thicker, according to the degree of convergence of the eyes. If the optic axes are parallel, the eyes being directed straight forward, or if the axes have any degree of convergence, the same simple horizontal line appears before each eye. Now when the threads are vertical, greater effort on the part of the internal recti is required to converge the optic axes upon the thread nearest us than upon the more distant ones. This tells us at once that they are not in the same plane. Every day's experience shows us that materials which have a fine parallel horizontal marking produce a certain indistinctness and unsteadiness in looking at them. This is due to the perception derived through the "muscular sense" of the recti.

In general terms the act of accommodation goes hand in hand with increased convergence of the eyes, and it might be objected to the above explanation of Prof. Meyer, that the muscular effort to produce this accommodation was what told us the relative position of the threads. This might be readily solved by paralyzing the accommodation of both eyes by a solution of Sulphate of Atropine and placing a definite convex lens before each eye.

Dr. A. A. Gould cited an instance of apparent want of perpendicularity in an upright object placed upon the top of a spire, which he thought was caused by the difference in distance of the two eyes from the object, while turning the head sideways and upwards.

Dr. Jeffries thought it might be explained by the failure of the oblique muscles of the eye to preserve the parallelism of the vertical meridians in the two eyes while the head was in this unnatural position.

Dr. H. W. Williams was of the opinion that this explanation was satisfactory, or that perhaps the effect was due to astigmatism.

Mr. F. W. Putman read the following extract from a letter written by Mr. Horace Mann, from a steamer in the Carribean Sea, in relation to the method of flight of the Flying-fish.

I have been watching the flying-fish to-day. They are very abundant, and though you may know all about them from persons more competent to see and describe than I, yet I venture to send you a few notes on them in my journal. I had supposed that they must acquire some considerable momentum below the surface before rising above it, and for that reason wished to see if the motion of the fish immediately after leaving the water was more accelerated than during the later portions of its flight (for it is obviously a true flight). I think that I have been able to discover some slight differences in the rates of motion immediately after leaving the water and later in their course; but I also think their motion is kept up by the fins, as well as that the weight is sustained by them. They do not appear to leave the water at a large angle, but otherwise; as near as I have been able to judge about 5° or 6°. They plainly have the power of altering their course of flight, so far as rising and falling, as I have seen them go over the rising surface of a not very high wave, and their flight is also almost always slightly dipping. I have also thought they sometimes altered their course to the right or left without touching the surface of the water, but it may have been owing to the wind. They will often barely touch the surface of the water and rise again, keeping on in the same or an altered course. There went a school of a dozen or twenty this very minute, rising and falling slightly, and entering the water and issuing from it again and again, and altering their course for the distance of seventy-five to one hundred yards. The motion of the fin is *not always* steady, as I have seen when they rose near the ship and the sun struck favorably upon them, for in these cases the motion was intermittent in velocity, though kept up all the time, and might be represented by a line more or less shaded. I have observed them fly thirty or forty yards without touching the water, though I should say usually they would not go more than half that distance. They do not usually rise much over a foot above the surface of the water, often much less, though one was said to have come on board the other day, and to do that I should think must have risen at least eight or ten feet.

Mr. A. E. Verrill made a communication on the genus *Lissogorgia* which he had established upon the *Gorgonia cancellata* Dana (*Antipathes flabellum* Esper).

This coral has the smooth axis and general appearance of *Antipathes*, to which it has been referred by most authors; but from an examination of the external crust preserved upon some specimens collected at Florida by an expedition from Williams College a few years since, and now belonging to the Lyceum of Natural History of that institution, he had been able to establish its affinities to the *Gorgonidæ*.

The principal character separating the orders *Alcyonaria* and *Zoantharia*, into which the class of Polyps is divided, are the pinnated tentacles of Alcyonaria, always eight in number, in contrast with the simple cylindrical tentacles of Zoantharia which are nearly always in multiples of six, though often amounting to several hundred; but in Antipathes, so far as yet known, there are but six. Dr. J. E. Gray has, however, placed this genus among the Alcyonaria, because in a dry specimen he had observed traces of eight tentacles; but as several genera of Alcyonaria are creeping and incrusting, and often cover dead stalks of Antipathes, Gorgoniæ, etc., so as to appear like the original polyps, it is not improbable that Dr. Gray has in this way been misled.* Another character in which the two orders differ, and

* *Gorgonia trichostemma* Dana, Zoöph., p. 665, pl. 59, fig. 3, is an instance of this. I have ascertained from an examination of the original specimen, that it consists of an axis of an Antipathes incrusted by a halcyonoid polyp, which often also extends in the form of a tube beyond the broken ends of the branches of the axis.

which has usually been neglected, consists in the peculiar combination of the structural elements or spheromeres. In the Alcyonaria there are eight of these spherical wedges which are united immediately to one another by their walls, so that there are no interambulacral chambers, and the radiating lamellæ seem to consist of a simple membrane, though structurally double. In the Zoantharia, on the contrary, there are interambulacral spaces between adjacent spheromeres, and within these spaces new spheromeres are introduced in those species having more than six. Solid radiating septa within the spheromeres seem never to be formed by halcyonoid polyps, though common among the Zoantharia; yet at first sight the present species seems to be an exception, for within the cells clusters of spine-like spiculæ seem to converge towards the centre, resembling somewhat the trabiculæ in the cells of some *Poritidæ*, but after close examination there appear to be eight clusters of these spines, which correspond to the clusters of spicula which are often present in the outer base of the tentacles of Gorgonidæ and other halcyonoids. When the tentacles in these cases are withdrawn into the cells, the spiculæ protecting their bases must be situated at the top of the cells and converge towards the centre; if these remain in place after the tentacles have decayed, they will produce the effect noticed in this instance.

In *Lissogorgia flabellum* the axis, as before remarked, is smooth and polished, with scarcely a trace of striations except at the base, so that the smooth character of the axis of a polyp is no longer an evidence of its belonging among the *Antipathidæ*, neither is the absence of striæ conclusive evidence that it is not to be placed among the *Gorgonidæ*. The external crust (cœnenchyma) in this genus is thin, very friable and spiculose; the color in these specimens is white, the axis black, opaque-yellow, and brittle at the tips. The cells are very small, oval, slightly raised, very near together and scattered nearly uniformly on all sides of the branchlets. The corallum is fan-shaped, undivided for about an inch at the base, above openly reticulated, the branchlets mostly coalescent except at the outer edges. The reticulations are from half an inch to two inches long and about a quarter of an inch wide.

Mr. T. T. Bouvé exhibited specimens illustrating three forms of fossil Echinoderms from the collection presented by Mr. Barnard.

Dr. J. C. White stated that the Subscription Committee had succeeded in raising only one-half of the required sum.

Mr. Thomas Gaffield made an earnest appeal to all the members to assist the Committee in their efforts.

The following gentlemen were elected Resident Members: Messrs. John M. Batchelder, Samuel W. Creech, Jr., Martin McKenzie, W. C. Henck, Jeffrey Richardson, Charles H. Parker, William L. Parker, S. G. Snelling, F. W. Brewer, H. P. Kidder, John A. Blanchard, Isaac D. Farnsworth, Thomas A. Goddard, George W. Wales, Charles D. Head, Thomas J. Lee, E. P. Bancroft and Frank S. Fiske.

March 16, 1864.

Mr. C. K. Dillaway in the chair.

Present, fifty-three members.

Mr. Alpheus Hyatt made some remarks on the general structure of the shells of Cephalopoda.

The septa had heretofore been supposed in all varieties and at all ages of growth, to be separated by regular intervals. But, in a natural section of a fragment of an undoubted Orthoceras, found by the Cambridge Expedition in the Silurian of Anticosti, the septa did not run in parallel lines, but inclined to each other, so that the ventral and dorsal edges of alternate septa met, forming a regular but very acutely angled zigzag line upon the surface of the section.

This zigzag arrangement, however, was apparently a characteristic of the development of the young rather than of the adult, since in the last three septa observable in the fragment, the ventral and dorsal edges no longer meet and the partitions were more nearly parallel.

The specimens are probably identical with some of the Orthoceratites described by Mr. Billings, but the want of figures in the Canadian Survey renders the identification of the species rather difficult.

Mr. C. C. Sheafe exhibited to the Society the plan of Whelpley & Storer's new furnace for the extraction of gold ore from its gangue; they claiming for this invention, that it is the only process by which an entire separation can be made. The principle herein introduced consists in first heating to a white heat the ore finely crushed, and then plunging it in water. By this means the gangue rock is exploded as soon as it touches the water into fine dust, and the gold falls in globules to the bottom. This dispenses in a great measure with the use of mercury. Attached to the furnace is the spray chamber through which all smoke and other aëriform products of combustion pass, so that nothing emerges from the smoke flue, except in the gaseous form. The air issuing from this flue can be breathed without discomfort.

Mr. F. W. Putnam narrated an instance of the assumption of the male plumage by a pea-hen, which had laid eggs, and had been in possession of one gentleman for seventeen years. The change began to take place three years ago, and was progressing up to the time of her death, when she presented the appearance of a young male in his second moult. The spurs were one-fourth of an inch in length.

An analogous change had also been noticed by others in certain fishes, particularly by the female trout in old age.

A communication was presented by the Secretary from Mr. Bradley Horsford of Springfield, on the dissection of the mineral Chiastolite, which was referred to the Publishing Committee.

Prof. Felipe Poey of Havana, and Mr. George W. Tryon, Jr., of Philadelphia, were elected Corresponding Members.

The following gentlemen were elected Resident Members:—Drs. H. B. Inches and R. W. Hooper, and Messrs. Joseph S. Fay, Jr., Henry H. Fay, Nathaniel Thayer, Peter C. Brooks, Joseph Vila, Jr., James Beck, Charles W. Galloupe, Sereno D. Nickerson, Henry F. Durant, A. W. Spencer and Edmund F. Cutter.

DONATIONS TO THE MUSEUM.

January 20. Chinese and Loo Choo Crania, by Dr. J. N. Borland.

February 3. 346 specimens of 296 species of mounted birds from the Smithsonian Institution, collected on various expeditions of the U. S. Government; 300 specimens of mounted foreign birds, by Dr. H. Bryant; 15 varieties of pigeons, by Mr. Gidney; a mounted Heron, by Dr. J. N. Borland; 33 crania of native birds and 3 crania of mammals, by Mr. W. H. Dall.

February 17. A valuable collection of fossil Echinodermata, made by Dr. A. Krantz of Bonn, presenting good types of nearly every group in the class, in which the American Museums are deficient, embracing specimens from all the formations from the Silurian upwards; also, a small collection of Echinoderms of living species, dry and in spirits, named by Mr. Alex. Agassiz; a full series of the casts in the Museum of Neufchatel, some corals and mollusca, two "Sa... of *Pristis*, and antlers of American deer, by Mr. James M. Barnard; specimens of oyster shells, barnacles, species of Gorgonia and minute crustacea removed from the bottoms of our iron-clad ships-of-war at Port Royal, October, 1863, by Mr. F. W. Merryman; suite of land shells of Williamstown, Mass., *Achatinellæ* from Sandwich Islands, shells from Wisconsin and elsewhere, and a chameleon's skeleton from Spain, by Mr. S. H. Scudder; a lot of butterflies of New England and cranium of Porcupine, by Mr. C. J. Sprague; a collection of butterflies and other insects, native and Brazilian, by Mr. W. C. Henck.

March 2. A large collection of New England birds'-nests and eggs, and a miscellaneous collection of mosses, crustaceans, shells, corals, etc., by Mr. W. C. Henck; fruits from India, crania of domestic rat and mouse, and portions of human crania from Delhi, by Mr. W. H. Dall; specimens of fish and reptiles from Newport News, Va., by Dr. Josiah Curtis; shells from Cuba, by Dr. Juan Gundlach; an Enfield rifle from the wreck of the Keokuk, encrusted with shells, by Mr. F. W. Merryman.

March 16. A specimen of *Aster amethystinus* obtained near West Cambridge, by Mr. A. E. Verrill; a collection of Fungi from Venezuela; two human Chinese skulls, crania of monkeys, Paradoxurus musanga, Manilla pig, of a petrel and gull from the Pacific, also, a collection in spirits, of fishes, reptiles, etc., from China, by Mr. George Sceva; crustaceans and reptiles in spirits, and a specimen of elephant's hair, by Mr. W. H. Dall; two bird skins, by Mr. Chamberlin; specimens of *Nucula thraciæformis* from the stomach of an American turbot, by Dr. Samuel Cabot; fruit of the nutmeg, *Myristica moschata*, in its various stages of growth, in spirit, from Singapore, by Mr. John Hooper.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1864.

Dictator Schaum! Ein offner Brief an alle Entomologen von L. W. Schaufuss. Dresden, 1863. 8vo. Pamph. *From the Author.*

Geognostische Wanderungen im Gebiete der nordöstlichen Alpen. Von C. Ehrlich. 8vo. Pamph. *From the Author.*

Das Geographische System der Winde, etc. Von Dr. M. A. F. Prestel. 4to. Pamph. Emden, 1863. *From the Author.*

Chilonidarum et Crambidarum genera et species. Scripsit P. C. Zeller. 4to. Pamph. *From the Author.*

Appunti Sulla Geologia del Piemonte di Bartolomeo Gastaldi. 4to. Pamph. Turin. *From the Author.*

On the Archeopteryx of Von Meyer, etc. By Prof. Owen. 4to. Pamph. 1862. *From the Author.*

Rainfall and Evaporation in St. Helena. By John Haughton. 8vo. Pamph. Dublin, 1862. *From the Author.*

Essay on Comparative Petrology. By M. J. Durocher. 8vo. Pamph. *From the Author.*

Synopsis of the Marine Invertebrata collected by the late Arctic Expedition, under Dr. I. I. Hayes. By Wm. Stimpson. 8vo. Pamph. *From the Author.*

Classification of North American Helices. By Thomas Bland. 8vo. Pamph. *From the Author.*

Description of six new species of Unionidæ from Lake Nyassa, Central Africa. By Isaac Lea. 8vo. Pamph. *From the Author.*

Proof sheets of a Synopsis of the Air-breathing Mollusks of North America. By W. G. Binney. 8vo. Pamph. *From the Author.*

The Classification of Animals based on the principle of Cephalization. On Fossil Insects from the Carboniferous Formation in Illinois. By J. D. Dana. 8vo. Pamph. *From the Author.*

Plantes Rares de la Gironde. Par MM. Ch. des Moulins et G. Lespinasse. Bordeaux, 1863. 8vo. Pamph. *From the Authors.*

Essai sur les Terrains Superficiels de la Vallée du Po. Par M. et B. Gastaldi. 4to. Pamph. *From the Authors.*

Epicrisis generis Hieraciorum. Scripsit Elias Fries. 8vo. Upsaliæ, 1862. *From Mr. C. J. Sprague.*

Reports on the Vernon and Ascot Mines. 2 Pamph. 8vo. *From Dr. C. T. Jackson.*

Notes on Diatomaceæ from the St. John River. By Prof. L. W. Bailey. 12mo. Pamph.

Report on Mines and Minerals of New Brunswick. By the same. 8vo. Pamph. *From the Author.*

Von dem Rechtszustande unter den Ureinwohnern Brasiliens. Von Dr. C. F. Ph. von Martius. München, 1832. 4to.

Die Fieber-Rinde, der China-Baum, sein Vorkommen und seine Cultur; vom geheimen Rath Dr. C. F. Ph. von Martius. 8vo. Pamph. *From the Author.*

Curtis's Botanical Magazine, Nos. 229, 230. 8vo. London.

Phycologia Australica. By Wm. H. Harvey. Parts 31, 33, 34. *From Mrs. B. D. Greene.*

Experimental Researches on the Granites of Ireland. Part III. On the Granites of Donegal. By the Rev. Samuel Haughton. London, 1862. 8vo. Pamph. 2 copies.

On the Rainfall and Evaporation in Dublin in the year 1860. By the same. Dublin, 1862. 8vo. Pamph.

On the Phenomena of Diabetes Mellitus. By the same. Dublin, 1863. 8vo. Pamph.

On the direction and force of the Wind at Leopold Harbour. By the same. Dublin, 1863. 8vo. Pamph. *From the Author.*

Anomalies Artérielles. By J. M. Dubrueil. 8vo. Paris, 1847.

Anatomie de Texture ou Histologie appliquée à la Physiologie et à la Pathologie. Par Ad. Burggraeve. 8vo. Gand, 1845.

Anatomie Comparée du Cerveau. Par E. R. A. Serres. 2 Vols. 8vo., and plates 4to. Paris, 1824.

Histoire Naturelle du Genre Humain. Par J. J. Virey. 3 Vols. 8vo. Paris, 1826.

Traité complet de l'Anatomie, etc., du Système Nerveux, Cérébro-Spinal. Par M. Foville. 1re Partie. 8vo., and plates 4to.

Introduction to the Study of Human Anatomy. By James Paxton. 2 Vols. Boston, 1840.

Encyclopédie Anatomique. Vols. IV., VI., VII., VIII. 8vo. and Atlas 4to Paris, 1843. *From Dr. Henry Bryant.*

Owen on the Megatherium. 4to. 1860. London.

Selby's British Forest Trees. 8vo. London.

Prehistoric Annals of Scotland. By Daniel Wilson. 2 Vols. 8vo. London, 1843.

The British Tortrices. By S. J. Wilkinson. 8vo. London.

British Stalk-Eyed Crustacea. By Thomas Bell. 8vo. London, 1853.

Student's Manual of Geology. By J. Beete Jukes. 8vo. Edinburgh, 1862.

Recent and Fossil Shells. By S. P. Woodward. 12mo. London, 1851–6.

Natural History. By Rev. J. G. Wood. 3 Vols. 8vo. London.

Geological Evidences of the Antiquity of Man. By Sir Charles Lyell, F. R. S. 8vo. London, 1863.

Palæontology. By Richard Owen, F. R. S. Edinburgh, 1861.

Descriptive Ethnology. By R. G. Latham. 2 Vols. 8vo. London, 1859.

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Monographie des Clypéastres Fossiles. Par M. H. Michelin. 4to. Pamph. 1861.

Die Echinoiden der Oberen Jura-Schichten. Von Dr. F. Rolle. 8vo. Pamph.

Note sur un nouveau Genre d'Échinide Fossile. Par M. G. Cotteau. 8vo. Pamph.

Note sur les Échinides de l'Étage Kimméridgien. Par M. G. Cotteau. 8vo. Pamph.

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A Voyage round the World. By J. F. G. de la Pérouse. 2 Vols. 4to. 1 Vol. fo. London, 1799.

Voyage in Search of La Pérouse. 4to. London. 1800.

J. H. Linckius. De Stellis Marinis. Lipsiæ. 1733. fol.

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Tenby: a Sea Side Holiday. By P. H. Gosse. 8vo. London, 1856.

Études sur les Échinides Fossiles. Par G. Cotteau. Vol. I., Livraisons 23–30. 8vo. Paris, 1861.

Récherches sur les Crinoïdes du Terrain Carbonifère de la Belgique. Par L. de Koninck et H. Le Hon. 4to. Paris, 1854.

Figures and Descriptions of Canadian Organic Remains. Decades 1–3. 8vo. Montreal, 1858.

Memoirs of the Geological Survey of the United Kingdom. Decades 1–9. 8vo. London, 1849–58.

Monographie der Fossilen Crinoiden familie. Von Dr. F. Roemer. 8vo. Pamph. Berlin, 1852.

Oversigt over Grönlands Echinodermata. C. F. Lütken. 8vo. Pamph.

Ueber die an der Küste von Mosambique beobachteten Seeigel, etc. Von W. Peters. 4to. Pamph. Berlin, 1855.

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Zeitschrift für die Gesammten Naturwissenschaften. 8vo. Berlin. 1862–1863.

Verhandlungen des Naturforschenden Vereines in Brünn. Band I. 1862. Brünn, 1863. 8vo.

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Jahresbericht der Naturforschenden Gesellschaft in Emden. 48er. 1862. Emden, 1863. 8vo.

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Bericht der Oberhessischen Gesellschaft für Natur- und Heilkunde. 10er. 8vo. Giessen. 1863.

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Feier ihres einhundert und vierten Stiftungstages gehalten von J. von Liebig. München, 1863. 4to.

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Die Feierliche Sitzung der K. Akademie der Wissenschaften am 3 Mai, 1862. 12mo. Wien.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. 8vo. Wien, 1863. Band. XLVI. Heft 1–5. Band. XLVII. Heft 1–4.

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Proceedings of the Royal Horticultural Society. Vol. III., No. 8. With Title and Index. Vol. V., Nos. 1–3. London, 1864. 8vo.

Proceedings of the Royal Institution of Great Britain. Vol. IV., Parts 1, 2. 8vo.

Proceedings of the Royal Society. Vol. XII., No. 57. 8vo. London.

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Journal of the Geological Society of Dublin. Vol. VII., Plates 8, 9. Vol. IX., Part 2. Vol. X., Part 1.

Proceedings of the Natural History Society of Dublin. Vol. IV., Part 1. 8vo.

Journal of the Royal Dublin Society. No. XXX. 8vo. 1863.

Canadian Naturalist and Geologist. Vol. VIII., No. 6. Dec. 1863. Montreal.

Geological Survey of Canada. 8vo. Montreal, 1863.

Transactions of the Literary and Historical Society of Quebec. Vol. IV., Parts 1, 2. Vol. V., Parts 1, 3. New Series. Vol. I., Part 1. 8vo. 1843–1863.

The Gold Fields of Canada. By Rev. James Douglas. 8vo. Pamph. Quebec, 1863.

Canadian Journal of Industry, Science and Art. No. 49. Jan., 1864. Toronto.

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Proceedings of the Academy of Natural Sciences of Philadelphia. No. 6, for Oct. and Nov., 1863. No. 7, Dec., 1863.

Proceedings of the California Academy of Natural Sciences. Vol. III., Sign. 5, Nov., 1863; 6, Dec., 1863; 7, Jan., 1864. 8vo.

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Schrank. Fauna Boica. 6 Vols. 8vo. Nürnberg. 1798.

Sulle coltivazione dei Gelsi e de' Filugelli e sul modo di diffondere le buone pratiche nelle provincie Venetæ di Gherardo Freschi. 4to. Pamph. Venizia, 1852.

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F. W. Ross. Neue Arten von Arachniden des K. K. Museums. 4to. Pamph.

F. V. P. Gruithuisen. Ueber die Daphnia sima und ihren Blutkreislauf. 4to. Pamph.

Notice of Rev. Wm. Kirby; from the Proceedings of the Entomological Society of London. 1850. 8vo. Pamph.

Verzeichniss der Schmetterlinge welche um den Ursprung der Donau und des Nekars dann um den untern Theil des Bodenses vorkommen. Tübingen, 1800. Pamph. 16mo.

J. T. Koelreuter. Dissertatio inauguralis medica de Insectis Coleopteris nec non de plantis quibusdam rarioribus. Tübingæ, 1755. Small 4to. Pamph.

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B. A. Carlson. Prodromus Hymenopterologiæ Scandinavicæ. Lundæ, 1836. 8vo. Pamph.

G. B. Schmiedlein. Historia divisionis Insectorum. Lipsiæ, 1790. 16mo. Pamph.

Baron M. de Chaudoir. Description d'une espèce nouvelle de Cicindèle trouvée en Russie. 8vo. Pamph.

J. Egger. Neue Dipteren-Gattungen und Arten aus der Familie der Tachinarien und Dexiarien. 8vo. Pamph.

J. O. Westwood. Synopsis of the dipterous family Midasidæ, with descriptions of numerous new species. London, 1841. 8vo. Pamph.

Lettre à S. E. M. Fischer de Waldheim ou relation d'un voyage fait en 1844 en Suède, en Danemarck et dans le nord de l'Allemagne. Par M. le Comte Mannerheim. 8vo. Pamph.

J. S. Semler's Nachlese zur Bonnetischen Insektologie. Erstes Stuck. Halle, 1783. 8vo.

J. Van der Hoeven. Espèces nouvelles d' Insecte. 8vo. Pamph.

J. C. Schluga. Primæ Linneæ Insectorum. Vienna, 1767. 8vo. Pamph.

C. F. Ludwig. Erste Aufzählung der bis jezt in Sachsen entdeckten Insekten. Leipzic, 1799. 16mo. Pamph.

V. Motschulsky. Antwort an Dr. Gebler auf einige seiner Bemerkungen. 8vo. Pamph.

Revue critique de quelques ouvrages récents de M. Victor de Motchoulsky. Par M. le Comte Mannerheim. 8vo. Pamph.

Beiträge zur Entomologie besonders in Bezug auf Schlesien herausgegeben. Von T. E. Schummel und F. Stannius. Vol. III. 16mo. Breslau, 1863.

Isak Twist. Specimen novam Hemiptera disponendi methodum exhibens. Small 4to. Lundæ, 1814. Pamph.

C. E. Elfvendahl. Hemiptera Sueciæ. Lond. Gothorum, 1828. 8vo. Pamph.

P. M. Lönblad. Hemiptera Sueciæ. Contin. I. Lond. Gothorum, 1829. 16mo. Pamph.

G. Lindström. Hemiptera Sueciæ. Contin. IX. Lond. Gothorum, 1829. 16mo. Pamph.

J. M. Barthii, De Culice dissertatio. Ratisb., 1737. Small 4to. Pamph. *By Exchange.*

Quarterly Journal of the Geological Society. Vol. XX., Part 1. London.

Annals and Magazine of Natural History. Nos. 73–75. 8vo. London. *From Courtis Fund.*

Life and Letters of John Winthrop. By R. C. Winthrop. 8vo. Boston, 1844.

Life and Letters of Washington Irving. Vol. IV.

Craik, Geo. L. History of English Literature. 2 Vols. 8vo. New York, 1863.

Kirk, J. Foster. History of Charles the Bold. 2 Vols. 8vo. Philadelphia, 1844.

Weiss, John. Life and Correspondence of Theodore Parker. 2 Vols. 8vo. New York, 1864.

Hunt, C. H. Life of Edward Livingston. 8vo. New York, 1864. *Deposited by Republican Institution.*

April 6, 1864

The President in the chair.

Thirty-eight members present.

Mr. A. Agassiz made a communication on the habits of the lower orders of marine animals, and the methods of capturing them.

Dr. Shurtleff, in connection with the change of plumage in the pea-hen communicated at the last meeting, mentioned the case of a black hen of the common fowl, which, after having been twice prevented from sitting, seemed to lose the power of laying, and assumed the plumage of the cock. The neck feathers first became golden, the spurs were lengthened and the tail feathers elongated. She was finally killed by mistake for a cock.

The President communicated the results of some recent investigations by himself and others in relation to the anatomical distribution of the nervous filaments in vertebrate animals, and instances of their passage across the median line of the body.

Mr. Bouvé announced the recent decease of Prof. Hitchcock, an honorary member of the Society, and moved the appointment of a Committee to prepare resolutions suited to the event.

The President appointed Messrs. Bouvé and C. T. Jackson.

Dr. A. A. Gould presented a communication

On the occurrence of an internal convoluted plate within the body of certain species of Crinoidea, by James Hall.

During the investigations upon the Crinoidea of the Carboniferous Limestones of Iowa, there were discovered in the broken bodies of several species, a vertical convoluted plate, filling a large part of the cavity of the body. At that time I showed several of these specimens to Prof. Agassiz, who informed me that he had observed a similar convoluted plate in the body of Comatula.

This convoluted intestinal plate was first observed in the body of *Actinocrinus pentagonus*, and afterwards in *Actinocrinus longirostris*, *Act. erodus*, *Act. Verneuili* and in a species of the type of *Act. umbrosus*. In several of the specimens, and this is apparently true of all the Actinocrinus, the opening into this convoluted sac is wider at the apex, and becomes gradually attenuated below and pointed towards the centre of the basal plates where it is attached. The lower portion is twisted not unlike the lower portion of some univalve shells, and this organ, in one specimen, presents a very close resemblance to a small Bulla or similar shell. In *Actinocrinus longirostris* this organ is proportionately very large, the sides straighter and less curved, and very wide at the top.

In *Agaricocrinus pentagonus* this point is not quite symmetrical, and lies a little oblique with a deep sinus on the anal side.

Mr. T. T. Bouvé announced that the sum thus far obtained by the Subscription Committee amounted to $15,000. Since the last meeting, Dr. Walker had expressed a strong desire that the desired amount might be raised during the present month.

The Secretary read the following letters which had been received since the last announcement:

From Thomas J. Whittemore, Esq., New York, March 9th, acknowledging his election as Corresponding Member; B. F. Culver, Esq., Treasurer of the Chicago Academy of Science, March 22d, asking for a copy of the Constitution and By-laws of the Society; Provinciaal Utrechtsch Genootschap van Kunsten en Wetenschappen, Utrecht, October, 1863; Société Royale des Sciences à Upsal, September 15th, 1863, acknowledging the receipt of the Society's publications: Naturhistorischer Verein in Augsburg, August 14th, 1863; K. Bayerische Akademie der Wissenschaften, München, November 20th, 1863; Die Zoologische Gesellschaft zu Frankfurt am Main, January, 1864; acknowledging the same and presenting their various publications: Bataafsch Genootschap der Proefondervindelijke Wijsbegeerte te Rotterdam, October 19th, 1863, acknowledging the same and promising an exchange of publications: Société Royale des Sciences à Upsal, October 15th, 1863; Kongl. Svenska Vetenskaps Akademien i Stockholm, November 18th, 1863; Royal Geographical Society, London, November 20th, 1863; K. Sächsische Gesellschaft der Wissenschaften, Leipzig, December 22d, 1863; Berwickshire Naturalists' Club, Alnwick, March 1st, 1864; and the Literary and Historical Society of Quebec, March 17th, 1864, presenting their various publications.

On motion of Mr. Stodder, a suspension of the rule was ordered, by which all books shall be returned to the library before the annual meeting. As the books had only been put in circulation within a few days, this seemed unnecessary at the present time.

The following gentlemen were elected Resident Members of the Society:—Messrs. Henry F. Lambert, William S. Appleton, Jonathan Dorr and John T. Ogden.

April 20, 1864.

Mr. C. K. Dillaway in the chair.

Thirty-two members present.

A Committee was appointed, consisting of Dr. A. A. Gould and Messrs. C. J. Sprague and Charles Stodder, to nominate a list of officers for the ensuing year.

The Chair also appointed Messrs. J. M. Barnard and Thomas Gaffield a Committee to audit the accounts of the Treasurer, and to report at the next and annual meeting.

The following Members were elected: — Messrs. T. P. Chandler, Edwin P. Dutton, Charles W. Wrightington, Jas. B. Richardson, J. S. Fay, Henry Hooper, Frederic G. Frothingham, Samuel Frothingham, Jr., Donald McL. Frothingham and S. Weld.

May 4, 1864.

ANNUAL MEETING.

The President in the chair.

Sixty-five members present.

The Secretary read a report of the last annual and last regular meetings.

Before proceeding to the regular business of the meeting, Mr. T. T. Bouvé presented for the Committee, the following address upon the character of the late Dr. Hitchcock, and a series of resolutions which were adopted and with the address, ordered to be communicated to the family of the deceased.

Mr. President: — In proposing to the Society resolutions of respect to the memory of our late distinguished honorary member, Professor Edward Hitchcock, I do not feel that there is any need of reviewing, even briefly, his career as a man of science, or of dwelling at any length upon his character as a man. His long spent life of service in the cause of education, his untiring devotion to whatever he deemed his duty, and his many acquirements and great ability are all too well known to make an extended notice necessary. Yet it may not be amiss to reflect for a few moments upon such an experience as his well-rounded life of labor in all good works presents to us.

In calling Dr. Hitchcock to mind, one cannot but think of him as presenting a good example of a man, in many respects, peculiarly American. There was something about him that at once expressed the influence of New England ideas and institutions, no less than that of self-culture and extended observation. Like many others of our countrymen who have become prominent in science and literature, his early education was not beyond that within reach of nearly all in our favored land; yet, through his natural ability and indefatigable perseverance, he early made himself known to men of science, both by astronomical and geological observations and publications. Subsequently, when pastor of a church, which office he held for some years, he by no means neglected the scientific studies he loved, or failed to impart to the public the result of his geological and mineralogical observations, as shown by his publications in the American Journal of Science and Arts.

But it is in connection with Amherst College and as the Geological Surveyor of the State of Massachusetts that he is best known.

Like many other Professors in some of our educational institutions, he was called upon to instruct in various branches, and by untiring labor he was enabled to accomplish an amount of work truly astonishing. Yet he never became so absorbed in present duties as to lose an opportunity of self-culture, especially in that science most dear to his heart, and to the advancement of which he gave a large portion of his life.

It is indeed interesting and most instructive to perceive how a man, without the endowment by nature of great genius, without the advantages of early systematic culture in science or literature, and without more aid from books or sympathizing minds than could have been within reach in his younger days, should have been able to accomplish so much for himself and others as a teacher and professor, and finally to achieve enduring fame as one of the leading geologists of the world by the production of such works as those of "The Final Report upon the Geology of Massachusetts," "The Ichnology of New England," and others which followed.

Mr. President, we may not and should not mourn the departure of our distinguished associate, as we would if he had been cut off in the vigor of manhood and not been allowed to fill up the measure of his usefulness by length of years. As it is, we have for *him* nothing to regret, for he had accomplished well his work and resigned life full of hope in a glorious future; only for ourselves, we may feel sad that we shall no more meet his kindly and genial greeting, or receive instruction from his pen.

In conclusion I offer the following resolutions:—

Resolved, That the members of the Boston Society of Natural History recognize in the death of their late distinguished associate, Dr. Edward Hitchcock, the loss to themselves and to the public of a man of comprehensive ability, of untiring devotion to the cause of science and of great private worth.

Resolved, That this action of the Society be communicated to the bereaved family of the deceased.

The Treasurer, before presenting his report, announced that the subscriptions to the Working Fund had reached the desired amount, and that the endowment of $40,000 had thus been secured.

The total receipts for the year amounted to $24,955.90, which added to the balance of last year made the whole sum $36,239.35. Of this, $7,700 were subscriptions to the Working Fund already paid. There had been expended during the year $31,121.16, of which $27,773.07 were for building purposes. The whole property of the Society, not including the Collection and Library, might be approximately estimated at $176,818. Cash on hand at close of year, $4,118.19.

The report of the Trustees of the Courtis Fund was also presented.

The Committee to audit the Treasurer's accounts made no report.

The Librarian, Mr. Dillaway, in presenting his thirty-first and final annual report, gave an interesting account of the progress of the Society in every department during his long connection with it. The library, at the time of his first annual report, contained about 200 volumes, most of which were of little value; it now contains over 6,000 volumes of great value. In 1833 the Society had published nothing and had no exchanges; now the Journal and Proceedings go to every kindred Society in America and Europe. Since the last annual meeting there have been received from donations, 915 volumes and 559 pamphlets and parts of volumes. This includes the munificent bequest of the late Dr. Greene. From exchanges have been received 40 volumes and 197 parts of volumes; making, with those from other sources, an addition of 970 volumes and 778 parts of volumes. Since occupying the new building every book has been numbered, labelled, catalogued and placed upon the shelves; for a great part of which labor the Society is under obligations to Mr. Scudder.

In closing, the Librarian presented the following tribute to the memory of Dr. John Ware, the second Vice President of the Society, "whose sudden death since the last meeting has called attention to the singular excellences of his character. We who knew him well can appreciate the greatness of the loss of such a man to his professional brethren and familiar friends. By the sick-bed, in the lecture-room of the University, in the councils of his professional associates, above all in that large circle where his cultivation and genial mind made his presence always so welcome, the death of Dr. Ware has elicited a tribute of respect which his pure and beneficent life has most surely merited."

Carefully prepared and interesting reports were presented by the Curators, showing the amount of work accomplished in their respective departments since the removal. Most of the collections were placed in the cases at present assigned to them and were ready for exhibition.

The Curator of Geology asked leave to present his annual report at the next meeting, which was granted.

The reports of all the above officers were accepted.

On motion of Mr. Sprague, the thanks of the Society were unanimously voted to Mr. C. K. Dillaway for his long and efficient services as Librarian during a period of thirty-one years.

The thanks of the Society were also voted to Mr. Stodder for his services as cabinet-keeper.

The Committee appointed to revise the Constitution and By-Laws made a report, which was passed upon by vote, and awaits the final action of the Society at the next meeting.

A donation of two musical instruments from China and Japan, and the skin of a Pangolin, *Manis pentadactyla*, were received from Mrs. James Phillips of Roxbury, and the thanks of the Society were voted for the same.

Mr. Leopold Babo presented several botanical specimens, for which also the thanks of the Society were voted.

The Nominating Committee presented a list of officers for he ensuing year, and the following gentlemen were elected:

PRESIDENT,
JEFFRIES WYMAN, M.D.

VICE-PRESIDENTS,
C. T. JACKSON, M.D. A. A. GOULD, M.D.

CORRESPONDING SECRETARY,
SAMUEL L. ABBOT, M.D.

RECORDING SECRETARY,
SAMUEL H. SCUDDER.

LIBRARIAN,
SAMUEL H. SCUDDER.

CUSTODIAN,
SAMUEL H. SCUDDER.

CURATORS,

THOMAS T. BOUVÉ,	OF GEOLOGY AND PALEONTOLOGY.
CHARLES J. SPRAGUE,	BOTANY.
THOMAS M. BREWER, M.D.,	OÖLOGY.
HENRY BRYANT, M.D.,	ORNITHOLOGY.
F. W. PUTNAM,	ICHTHYOLOGY.
JAMES C. WHITE, M.D.,	MAMMALOGY AND COMPARATIVE ANATOMY.
SAMUEL H. SCUDDER,	ENTOMOLOGY.
B. JOY JEFFRIES, M.D.,	MICROSCOPY.
FRANCIS H. BROWN, M.D.,	HERPETOLOGY
CHARLES PICKERING, M.D.,	ETHNOLOGY.
WILLIAM T. BRIGHAM,	MINERALOGY.
ALPHEUS HYATT,	CONCHOLOGY.
A. S. PACKARD, JR.,	CRUSTACEA.
A. E. VERRILL,	RADIATA.

The Corresponding Secretary read a list of letters received from foreign Societies during the month of April.

From the K. Leopoldinisch-Carolinisch Deutsche Academie, Dresden, September 7th, 1863; Naturhistorischer Verein in Augsburg, December 1st, 1863; Société des Sciences Naturelles, Neuchatel, December 11th, 1863; Royal Physio-Economical Society, Kœnigsberg, Prussia, December 15th, 1863; K. Universitats Bibliothek, Göttingen, January 16th, 1864; K. Gesellschaft der Wissenschaften in Göttingen, February, 1864; Corporation of Harvard College, Cambridge, April 16th, 1864; Lyceum of Natural History, New York, April 18th, 1864, acknowledging the receipt of the Society's publications: Verein für Vaterländische Naturkunde in Württemberg, Stuttgart, October, 1863; Naturforschende Gesellschaft in Emden, October 8th, 1863; Ferdinandeum zu Insbruck, October 12th, 1863; Société de Physique et d' Histoire Naturelle de Genève, February 21st, 1864; Société des Sciences physiques et naturelles, Zurich, March 20th, 1864, acknowledging the same and presenting their publications: Naturforschende Gesellschaft in Danzig, October 1st, 1863; K. Preussische Akademie der Wissenschaften, Berlin, November 30th, 1863; Société Royale des Sciences de Liége, January 21st, 1864; Senckenbergische Naturforschende Gesellschaft, Frankfurt, February 1st, 1854; K. Leopoldinisch-Carolinisch Deutsche Academie, Dresden, March 1st, 1864; Naturforschende Gesellschaft, Görlitz, March 2d, 1864, presenting their various publications: Naturforschender Verein, Berne, December 12th, 1863: presenting its publications and proposing an exchange; and the Directeur de la Bibliothéque Impèriale Publique de St. Petersbourg, January 10th, 1864, proposing an exchange of publications.

The following gentlemen were elected Resident Members:—Dr. D. M. Parker, Dr. J. C. Sharp, Messrs. John Foster, Thomas Wigglesworth, J. L. D. Barton, Jacob Norton, Cleveland Abbe, O. H. St. John and William James.

May 18, 1864.

The President in the chair.

Twenty-five members present.

The Society having by accident omitted to vote for Treasurer at the previous meeting, proceeded to ballot for that officer, and Mr. T. T. Bouvé was duly elected.

The change in the Constitution and the new code of By-Laws proposed and acted upon at the last meeting were finally adopted by a vote of the Society.

Mr. A. Agassiz made a communication on the development of Comatula.

Mr. Waterston presented a section of a large ash-tree cut by a beaver on the borders of Lake Superior, together with a stuffed skin and skull of the same animal; also a piece of willow cut for its winter's food.

The President remarked that he had found willow bark and wood in the stomach of a beaver from Massachusetts.

Dr. Jackson also made some remarks upon the habits of the same animal.

Mr. Putnam presented a species of fish from Williamstown, new to the fauna of Massachusetts, *Semotilus corporalis* Abbot.

The President read a paper on the

Development of Moulds in the interior of Eggs.

Exp. 1. An egg was placed in a shallow dish near a stove, where it was exposed to a warm temperature, and at times on the stove pipe, where it was heated above the temperature of boiling water. At the beginning of the experiment, Dec. 15th, 1863, the egg weighed 64.050 grammes, and at the end, April 8th, 1864, it weighed 43.600 grammes, having lost by evaporation 20.450 grammes.

It was then placed in a close glass jar at the ordinary temperature of the room, and remained until April 26th, when the egg was opened and found to contain an abundance of mould in all stages, from that of spore to that of fructification. In addition to the moulds were large numbers of monads exhibiting very active movements of translation.

Exp. 2. A second egg, exposed under the same circumstances as the preceding, weighed at the beginning of the experiment, Jan. 6th, 1864, 59.170 grammes, and at the end, April 8th, 39.520 grammes, having lost 19.650 grammes. This was also placed in a closed jar until April 26th, when the egg was opened and found to contain a thick layer of mould growing from the surface of the albumen.

In both cases a large air space was formed at the large end of the egg, and both the shell and shell membrane were entire.

These experiments tend to show the incorrectness of the statements made by Quatrefages and others, in the recent discussions in the Academy of Sciences in Paris, in which it is asserted that neither mould nor animalcules are found in the interior of eggs, all spores and ova being excluded by the shell and its membranes.

The following gentlemen were elected Resident Members: — Drs. Henry Bartlett, W. O. Johnson, Messrs. William M. Courtis, Thomas Waterman, Jr., Robert Amory, Elisha Atkins, Willard S. Brewer, Albert L. Murdoch, J.

Collins Warren and Charles S. Lynch. Richard Q. Cay, Esq., of Matanzas, was elected a Corresponding Member.

June 1, 1864.

The President in the chair.

Thirty-two members present.

Prof. W. B. Rogers presented an original cast in sandstone of bones from the Mesozoic Rocks of Middlebury, Ct. The stone was probably the same as that used in the construction of the Society's Museum; it was found at Newport among the stones used in the erection of Fort Adams, and he owed his possession of it to the kindness of Capt. Cullum.

Prof. Wyman remarked that it was the fore limb of an animal in which reptilian characters predominated, and in connection therewith entered with some detail into the structure of the Archyopteryx as illustrated by Prof. Owen, and compared it with the true birds.

Mr. C. J. Sprague exhibited a twig of an apple tree from Lowell, which had been reported to him as always bearing fruit but no flowers — it was an instance of arrested growth, the petals being reduced to small green scales even smaller than the sepals. The flowers were all pistillate, a close examination revealing no stamens whatsoever. The immature seeds were distributed in an irregularly racemose manner, instead of being verticillate as in the normal state of the flower.

Dr. J. C. White stated on behalf of the Committee of Arrangements that the Dedication of the new Museum would take place on the afternoon of June 3d, and that full arrangements had been made for that occasion.

Dr. White read, at the request of the Council, the Library and Museum Regulations, passed at their last meeting.

The following were elected Resident Members: — Dr. John Homans, C. G. Bush, J. O. Greene, Geo. J. Dickinson and John S. Bradbury.

June 3, 1864.

EXTRA MEETING.

The Society met in the great hall of the Museum to dedicate the building to the purposes for which it had been erected. In addition to the members of the Society, a large company of the friends of Science was in attendance, completely filling the hall.

At a quarter past 4 o'clock the meeting was opened by the President of the Society, Professor Jeffries Wyman, who invited Rev. Dr. Hill, President of Harvard University, to offer prayer.

Prof. Wyman then made a few preliminary remarks, expressive of the gratitude which the members of the Society felt for the high position which it now occupied, through the liberality of the Commonwealth and the munificent bounty of private individuals.

Professor Wm. B. Rogers was introduced, and gave a brief history of the efforts which had resulted in the beautiful edifice to which the audience were now welcomed, and paid a tribute to the patrons of the Society deceased during the past year, Drs. Benj. D. Greene, George Hayward and John Ware. After several unsuccessful applications, the Legislature, while the flames of civil war were lighting up the country, made to the Society the grant of land which it had asked for. For this gift to the advancement of science and the practical arts in this country, the Society was indebted to Governor Andrew, as much as to any other man.

Since the Society commenced its career, many of the great lights of science had sunk below the horizon, but other lights had arisen to take their places. It was an error to suppose that the removal of one or two men could stop the advancement of science. There is an intellectual law which controls the forces of man, and compels his progress.

Professor Rogers spoke of the progress of the Society as affording a powerful stimulant to the student, and to those who desired to assist him. Science was the stairway by which we ascend to the upper highway of thought, and acquire a knowledge of the laws of the Divinity.

The speaker regarded the interest centred in the Society during these years of war, as an evidence of the regard of the community for truth. In closing, he gratefully spoke of those who were struggling for that peace, without which, conquered and secured, this triumph of theirs, and all others of a like nature, would vanish like smoke.

Mayor Lincoln next addressed the assembly. He considered what had been done for the Society as advancing the honor and reputation of the city, and in the name of its citizens, bade the members God speed in all their honorable efforts.

Lieut. Lutke, of the Russian Navy, aide-de-camp of the Grand Duke Constantine, and member of a scientific Society in Russia, was here introduced to the audience, and took a seat on the platform.

Rev. Mr. Waterston followed, expressing his conviction that this Society embraced one of the highest human interests. It was a counterpart to the Public Library and the Institute of Technology, and was in pursuit of most glorious objects. It was an institution in which all citizens might take an interest, for it gave them an opportunity of enlarging their means of instruction. The speaker enlarged upon the importance of the institution, and the reverent gratitude with which its success should be viewed, since it would bring to all who participated in its benefits an increased enjoyment in the duties and pleasures of life. In urging the audience to contribute to the collections of the Society, the speaker stated that Dr. Jackson had expressed a willingness to give his entire cabinet, of twenty thousand specimens, gathered at a cost of $10,000, to this institution.

Professor Rogers again rose to do justice to the taste, zeal and conscientious devotion of the architect of the building.

Lieut. Lutke, having been called on, expressed his high gratification in being able to participate in the ceremonies of dedication.

The exercises were here brought to a close, and the President of the Society invited the audience to remain and examine the rooms and collections.

The building thus dedicated to science is built of granite, brick and freestone, measuring ninety-five by one hundred and five feet. The height of the basement above the ground is six feet; the first story is sixteen feet high, the second eighteen feet, and the third eighteen feet, with a lantern roof above, making the total height of the building, to the top of the pediment, eighty feet. It is built in the classic style of architecture, with Corinthian pilasters and capitals. The foundation of the building is of heavy hammered granite; the first story of freestone, and the second and third of brick, with walls three feet in thickness, having an air space in the interior. The exterior trimmings are worked from freestone. Over the main entrance is carved the seal of the Society, with the head of Cuvier, from drawings furnished by the Directors of the Jardin des Plantes, Paris. On the keys of the front windows of the first story are cut heads of the lion, the bear, the boar and the zebra; on the south window keys, the jaguar, the camel, the bison, the gnu and the walrus; and on the north side, the wolf, the tapir, the rhinoceros, the gorilla and the kangaroo. The pediment is surmounted by a carved eagle facing the east. In the friezes of the second story are the names of three great naturalists, — Aristotle, Linnæus, Cuvier.

On entering, the visitor is confronted by two large bears, cut in walnut, supporting carved walnut candelabra at the foot of the oak staircase leading to the grand hall. On the left is a library room thirty feet square. Here are placed the portraits of Linnæus and Nuttall, and other well-known naturalists, and a plaster cast of Cuvier from the Directors of the Jardin des Plantes. This room is connected by the Secretary's office with a room in the rear of a like size, and to be used for a similar purpose. In the rear of the vestibule is the lecture-room, forty by forty feet, and on the right are the ethnological and botanical rooms, each thirty by thirty feet. Between these two, and connecting them, is a small room for the microscopical department.

Ascending the staircase to the grand hall on the second floor, the skeleton of an elephant is met, placed on the platform constructed over the heating apparatus. A similar platform directly in the rear of the stairway is designed for the reception of a cast of the megatherium, in the Royal College of Surgeons, London, presented by Joshua Bates, Esq., of that city. The hall runs through the centre of the building embracing two stories, is forty by ninety feet on the floor, and sixty feet in height. The ceiling is stuccoed in panel, scroll and fretwork, and the hall is lighted by windows in the front and rear, and in the roof. Two balconies, of unique design, supported by iron bearers, extend around the hall. Opening from the hall floor are four square rooms, thirty by thirty feet, to be provided with cases and balconies connecting with the hall balconies. The eastern end of the hall and one south room are to be devoted to the department of Geology and Paleontology; the corresponding room on the north side to Mineralogy; the western end of the hall and adjoining rooms to the department of Comparative Anatomy, which exhibits one of the largest collections in the country. The cases in the hall are decorated with the horns of large ruminants. On this floor are also two small working rooms. The third story and balconies are reached by open flights of stairs on each side of the hall. This upper story has four wing rooms, corresponding with those on the hall floor, with smaller rooms connecting them; and is devoted to the departments of Ornithology, Oölogy, Herpetology, Ichthyology, Conchology, Crustacea, Radiata and Entomology.

In the central apartment of the basement is the large fire-proof Gold heating apparatus, with three boilers which supply steam for heating the building throughout. The two front wing basement rooms are intended for storage, and the corresponding rear rooms are to be occupied as janitor's and dissecting rooms. Adjoining the latter is a smaller macerating room.

The building is provided with a dumb waiter, closets, and every other convenience required by the purposes to which it is devoted. It is finished in oak, chestnut and walnut, presenting a chaste and substantial appearance.

The architect of the edifice is Mr. Wm. G. Preston, who was assisted in the construction by the knowledge of building possessed by his father, Mr. Jonathan Preston. The fine carving of animals' heads in the window keys, and of the Society's seal over the main entrance was executed by Mr. Garret Barry; the eagle surmounting the pediment was carved by Mr. Edlifston, and the bears cut in walnut at the foot of the staircase leading to the grand hall, as well as the candelabra which they support, were the work of Mr. Rinn.

The total cost of the edifice is estimated at nearly $100,000.

June 15, 1864.

The President in the chair.

Thirty-eight members present.

Mr. S. H. Scudder presented a series of fossils, some of which were exhibited, obtained during a recent visit to Cuba, from the Tertiary Rocks of Matanzas. They were obtained from three different localities; (a), quarries of soft coral rock beyond the Paseo where no distinct marks of stratification could be seen; (b), strata of gravel inclined at an angle of 45° which seem to rest upon the former (are generally non-fossiliferous) and are situated on the left bank of the Yumuri river just before it empties into the bay; (c), soft limestone rocks which underlie the gravelly strata at a similar angle dipping to the south, and form the greater portion of the Cumbre which separates the Valley of the Yumuri from Matanzas Bay; upon the sides of small caverns in the latter were also found masses of clay hardened so as to be distinguishable only by slight differences of color from the rock itself, containing large quantities of the remains of land-snails. Some of the specimens exhibited were kindly presented to him by Señors Garcia and Jimeno. He also exhibited specimens of the non-fossiliferous rocks of the Isle of Pines, and made the following statements concerning the physical geography of the island: —

The island is situated south of Cuba at the meridian of Havana, and differs entirely in its physical aspects from Cuba, or at least that part of it which lies between Havana and Cardenas. The country is very level indeed, the southern half very marshy, the northern with numerous short ranges of mountains, which, in all cases, run almost directly north and south, and rise abruptly from the plain. The mountains may be divided into two classes, — those which are found upon the north coast and those rising in the centre of the island; the former are composed of three parallel ranges between one and two miles apart, called respectively from west to east, Sierra de las Casas, Sierra de los Caballos, and Bibijagua — the latter is but an insignificant row of hills, while the other two are more elevated and afford many instances of striking scenery, their sides being frequently very precipitous, especially upon the western slope, and their outlines very broken and craggy. Sierra de los Caballos is broken up into three separated ranges: the northernmost projecting boldly into the sea, forming the promontory called the Columpo; the central portion called Mango, forming the greater portion of the range, attains the height, as measured by the barometer, of 943 feet above the sea; the southernmost, a little higher than Columpo, is called El Seperatim. Sierra de las Casas is also broken up into two ranges, the southernmost being the highest, but neither of them were measured; they are, however, of all the mountains, next in height to the Sierra de los Caballos; between these two ranges runs the Rio de Sierra Casas, and the town of Nueva Gerona is situated on its left bank about two miles from the mouth, at the limit of steamboat navigation.

These mountains are formed of very hard limestones, forming in some places a marble of medium quality, which has been quarried upon the eastern slope of Mango; calc spar was found in considerable quantity upon the summit, and large veins of quartz are found especially upon Sierra de las Casas. The rocks dip at an angle of 60° to the east. The vegetation of the region surrounding these mountains is wanting in the two species of pitch pine which grow so abundantly in all other parts of the island and from which it has received its name.

The other series of mountains is formed of eight or ten parallel, very short ranges extending from the Sierra de la Cañada upon the northwest coast to the San Jose mountains upon the eastern coast just south of the middle of the island, taking as a whole the general direction of W. N. W. and E. S. E. Each range, however, preserves within a few degrees the same general direction as those of the northern hills. The Sierra de la Cañada is the range farthest to the northwest of any on the island; its western slope is characterized by lofty precipices, the mountain itself being the highest on the island, 1007 feet high. San Pedro comes next, both in position and height; its central peak being 636 feet; the two others being respectively about 10 to 25 feet higher. Between this and the Pico de la Daguilla; the next most prominent mountain lying about south east of the hamlet of Sante Fé, are formed the Sierra de los Cristales which do not rise to any considerable height, but the general level of the country is much more broken between them. The Pico de la Daguilla appears to form an exception to the general rule as regards the direction of the ranges, though the exception is only one of appearances. Its summit, which rises into a conical form near the apex, reaches the height of 590 feet, and being quite free of trees commands the best view of the whole island. The San José hills are low and inconspicuous, more like those of Bibijagua, and are separated at a wide distance from the Pico de la Daguilla, besides lying a little north of the general trend of the series of ranges. These mountains are composed of mica and talcose slate intermingled with considerable quartz, especially upon the Sierra de los Cristales, the slates varying considerably in different places, being much altered upon the Pico de la Daguilla. Though no good opportunities for direct examination were offered, yet the slates appeared to rest upon the limestones; both were altogether destitute of fossils, — with the exception of the Pico de la Daguilla, which, in this respect, more resembled the northern mountains. The central ranges were covered with a growth of pine. The level plains were covered with a conglomerate rock of a peculiar character, consisting of small black pebbles in a reddish paste, strongly impregnated with iron, affecting the compass even at the distance of fifteen feet from the ground. The roads over this were exceedingly hard and smooth.

Mr. Niles stated that he had noticed among the hills of Western Massachusetts, that frequently there are hills on different ranges having similar appearances in the characters of their surface, soil and vegetation.

On a closer examination he had observed the underlying rock was the same. The ranges of hills trend in a northwesterly and southeasterly direction, while the strata with a vertical dip have a strike of nearly north and south. Therefore the stratum which on one range constitutes the fundamental rock of a certain farm or tract of land, may form the underlying rock of a farm on an eastern range but situated to the north; or, of a farm on a western range, but located to the south. He observed that the number and character of the springs were similar on those farms of different ranges which have the same kind of rock. The owner of a certain hill-top farm could raise with success the same crops as another hill-top farmer having the same underlying rock, but on another range a mile or two distant to the north or south. Each could benefit from the experiments of the other, while neither could learn from the success of his nearest neighbor on the same range, if he had a different rock underlying his farm.

He was familiar with an instance where the indigenous and introduced vegetation of two farms differed quite conspicuously in some species, although they are on the same range and the farm-houses are not more than one hundred rods distant. The one with underlying granite rock has an abundance of the Butternut, *Juglans cenerea Linn.*, Purselane *Portulucca oleracea Linn.*, and common burdock *Lappa major Gærtner*, while the other farm with mica-slate rock has neither of these species.

A difference in the water is quite obvious. On the inside of the tea-kettle used on the farm with the mica-slate rock was to be found a thick incrustation, while the tea-kettle of the other farm was quite free from anything of the kind. Coincident with this is also a phenomenon observed in the manufacture of maple sugar on the two farms. The vessels used for evaporating the sap on the farm overlying the mica-slate rock, become incrusted like the tea-kettle, while on the farm on the granitic rock the evaporating vessels, like the tea-kettle, are perfectly free from sediment. This incrustation is the same as what the farmers frequently call sand or grit in sugar.

Mr. Niles exhibited specimens of the sediments from both the tea-kettle and sugar-boiler of the farm situated on the mica-slate rock. He remarked that they had been carefully analyzed by Mr. A. G. Hill, of the Lawrence Scientific School, with the following results: —

In the sediment from the tea-kettle were found present, Carbonate of Lime, Carbonate of Magnesia and traces of Phosphate of Lime, Phosphate of Magnesia, Chloride of Sodium and Carbonate of Iron.

In the sediment from the sugar-boiler were found present, Phosphates of Lime and Magnesia, traces of Oxalates and Tartrates of Lime, Magnesia and Phosphate of Soda.

Mr. Niles thought that observations on the character and position of the underlying rock would be of practical value to only the hill-top farmers of Western Massachusetts, and not to the valley farmers where the different soils had become mixed by aqueous agency.

Mr. L. Wetherell stated that he was familiar with two farms upon which gypsum was used on the clover crops, to no effect in one case, while in the other it was invariably attended by a three-fold crop, the two farms being but a quarter of a mile from one another. Mr. Niles related a similar case.

Mr. Octavius Pickering exhibited and presented the roots of a weeping willow, which were found in the following condition: The tree, eight inches in diameter, had shown signs of decay the last year, and this year put out no leaves except on a few limbs; on examination the bark appeared to be split, and it was found that a new bark was forming beneath the old, and that the new roots were put out here and there between the two layers of bark, aiming unquestionably to reach to the ground, and assuming by their position a strange flattened appearance. Prof. Wyman mentioned that in a similar case in his own garden the roots had really reached the ground.

Dr. W. E. Rice presented, on behalf of Mrs. Rice, an oil painting, by herself, of the Hayward quarry at Braintree, famous for its remains of Paradoxides; the thanks of the Society were voted to Mrs. Rice.

Mr. T. T. Bouvé moved the passage of the following vote:

Voted, That the President and Treasurer of the Boston Society of Natural History are hereby authorized to accept on behalf of the Society, from William J. Walker, his gift of $20,000, on the conditions which shall be agreed upon between the said William J. Walker on the one part and the said Boston Society of Natural History on the other, and to affix to the said agreement their names and the corporate seal of the Society.

Mr. Bouvé moved that when the Society adjourned, it be to the third Wednesday in September.

On motion of Mr. Bouvé it was voted that the names of subscribers to the Working Fund be entered upon the Record of the Society.

Prof. Wyman mentioned that Dr. W. J. Walker had pointed out to him a peculiar habit of the earth worm of pulling into its hole the tops of onion stalks, which was done by the passage of the body around one side of the stalk a little way above the ground, and bringing the top to the ground by the weight of its body. Prof. Wyman was shown many instances where the onion-tops penetrated to the depth of two or three inches.

The following gentlemen were elected Resident Members: Messrs. Jeremiah Whipple and Abner Chapman.

DONATIONS TO THE MUSEUM.

April 20. Fruits, insects, etc., from St. Thomas Island, by Mr. Samuel Wells, Jr.; two sclerotics of the horse-mackerel, by Dr. B. J. Jeffries; a large collection of reptiles, birds, etc., from the Gaboon River, Bombay and other localities, by Dr. J. H. Otis, U. S. N.; shells, and tooth of an elephant, by Mr. W. H. Dall.

May 4. Two musical instruments from China, and the skin of a *Manis pentadactyla*, by Mrs. James Phillips; a collection of plants, by Mr. L. Babo.

May 18. Calcite and other minerals, from Martinsburg, N. Y., and from the Trenton Limestone and Lead-bearing rocks of Black River, N. Y., by Dr. C. T. Jackson; mounted skin and skull, with a section of a large ash tree, cut by a beaver on the borders of Lake Superior; *Semotilus corporalis* Abbot, from Williamstown, Mass., by Mr. F. W. Putnam; Phoca, from Greenland, in exchange; copper ore, from Chili and California, by Dr. B. S. Shaw; numerous skins of birds, from California and South America, by Prof. W. B. Rogers; a valuable collection of skins and mammals, from Arctic America; *Vulpes lagopus* ♂, Fort Anderson, *Spermophilus Parryi*, Anderson River, north of Bear Lake, *Erethizon epixanthus* ♀, Youkon, *Arctomys pruinosus*, *Sciurus hudsonicus*, Deer Creek, Arctic America, *Lepus sylvaticus*, Fort Desmoines, Iowa, *L. Townsendii*, Deer Creek, Nebraska, and some reptiles and insects, from Massachusetts and Georgia, by Dr. H. Bryant; the seed vessel of *Trapa bicornis*, from Asia, by Mr. D. J. Brown; alcoholic specimens of the fruit of *Myristica moschata*, by Mr. C. H. Parker; the great blue heron, *Ardea herodias*, by Dr. A. Coolidge; a white bellied mouse, *Hesperomys leucopus*, from Mr. Brewer; a microscopic section of the enamel of the mastodon's tooth, from C. Johnston, M. D., of Baltimore; *Cyclopterus lumpus*, from Swampscot, Mass., by S. M. Buck; twenty-seven specimens of fishes, from Williamstown, Mass.; eleven fishes, from Bonne Esperance, Labrador; six fishes, taken off Cape Ray, by the Greenland Expedition, Lyceum of Natural History, Williams College; seven fishes, from Panama, S. A., by Mr. W. A. Nason.

June 1. Original cast in sandstone of bones from the Mesozoic rocks at Middlebury, Ct., by Prof. W. B. Rogers; magnetic oxide of iron and emery, found in the veins of the ore, from Chester, Mass., by Dr. C. T. Jackson.

June 15. Stones of the scarlet-flowered peach, from China, by Dr. C. Pickering; roots of weeping willow, by Mr. O. Pickering; *Samia Cecropia*, from Milton, by Mr. J. Fairbanks; skull and bones of *Rangifer grœnlandicus*, by Mr. W. Beetle; *Cyanurus cristatus*, young blue jay, by Mr. H. A. Purdie; two bats, eleven specimens of birds, twelve reptiles, a crustacean and one hundred and fourteen mollusca, from the Isle of Pines, W. I.; two hundred and twenty-five specimens of fossils, from Matanzas, Yumuri, Cuba, thirteen specimens of rocks and fossils, from Calabazar, near Havana, five specimens of rocks and crystals, from Caevas de Belle, near Matanzas; forty-one specimens of rocks and minerals, and sixteen Fungi, from the Isle of Pines, by Mr. S. H. Scudder; by purchase, thirty-four species, comprising thirty-six specimens of fishes, from Havana, Cuba, determined by Prof. Felipe Poey.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1864.

Report of the Superintendent of the United States Coast Survey for 1861. 4to. Washington. *From the Superintendent.*

Preliminary List of the Plants of Buffalo and its Vicinity. By Geo. W. Clinton. 8vo. Pamph. 1864. *From the Author.*

Glossaria Linguarum Brasiliensium. Von Dr. C. F. P. von Martius. 8vo. Erlangen, 1863. *From the Author.*

Descriptions of six new species of Unionidæ, from Lake Nyassa, Central Africa. By Isaac Lea. 8vo. Pamph. *From the Author.*

Smithsonian Miscellaneous Collections. Proof Sheets of a Synopsis of the Air-breathing Mollusks of North America. By W. G. Binney. 8vo. *From the Author.*

A Descriptive Catalogue of the Birds of Massachusetts. By E. A. Samuels. 8vo. Pamph. Boston, 1864. *From the Author.*

Fossils from the Potsdam of Wisconsin and Lake Superior. By Prof. A. Winchell. 8vo. Pamph. 1864. *From the Author.*

A Discourse delivered in Amherst, March 2, 1864, at the funeral of the Rev. Prof. Edward Hitchcock, D. D., LL. D. By Prof. Wm. S. Tyler. 8vo. Pamph. Springfield, 1864. *From the Author.*

On the Acid Tartrates of Cæsia and Rubidia. By Prof. J. P. Cooke. 8vo. Pamph. 1864. *From the Author.*

Description of a New Species of Chœrajulis from North Carolina. On an unnamed generic Type allied to Sebastes. Description of a new generic Type of Ophidioids, etc. By Theodore Gill. 8vo. Pamph. *From the Author.*

Catalogue of North American Butterflies. By J. Am. Weidemeyer. 8vo. Pamph. Philadelphia, 1864. *From the Author.*

Photographs of *Samia Columbia* Smith. By A. E. Verrill. *From the Author.*

Elements of Natural History. By W. S. W. Ruschenberger, M. D. 2 vols. 12mo. Philadelphia, 1860. *From the Author.*

Notice sur Paul Dalinier. Par M. Hébert. 8vo. Pamph. *From the Author.*

Die Sonne und ihre Flecken. Von Dr. Rudolf Wolf. 8vo. Pamph. Zurich, 1861. *From the Author.*

The Classification of Animals based on the Principle of Cephalization. No. 3. Classification of Herbivores. Note on the Position of Amphibians among the Classes of Vertebrates. By J. D. Dana. 8vo. Pamph. 1864. *From the Author.*

The Geology and Archæology of Beadnell, Northumberland, with descriptions of fossil Annelids. By George Tate. The Land and Fresh-water Mollusca of Alnwick. By George R. Tate, M. D. 8vo. Pamph. Alnwick. 1858. *From the Authors.*

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

The Natural History of Norway. Translated from the Danish original of the Right Rev. Erich Pontoppidan. fol. London, 1755. *From Dr. J. Jackson.*

Inaugural Address of His Honor Frederick W. Lincoln, Jr., Mayor of the City of Boston to the City Council, Jan. 4, 1864. 8vo. Boston, 1864. *From the City.*

Population of the United States in 1860, compiled from the original returns of the Eighth Census. By Joseph C. G. Kennedy. 4to. Washington, 1864. *From Hon. Charles Sumner.*

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The Berwickshire Mountain Limestone Fauna. By George Tate. 8vo. Pamph.

The Polished and Scratched Rocks in the Neighborhood of Alnwick, viewed in connection with the Boulder Formation in Northumberland. By George Tate. 8vo. Pamph. Alnwick, 1860. *From the Author.*

Hemiptera of the North Pacific Exploring Expedition, under Com'rs. Rodgers and Ringgold. By P. R. Uhler. 8vo. Pamph.

Contributions to the Neuropterology of the United States. No. 1. By P. R. Uhler. 8vo. Pamph.

Descriptions of a few new species of Hemiptera, and observations upon some already described. By P. R. Uhler. 8vo. Pamph.

Hemipterological Contributions. Nos. 1, 2. By P. R. Uhler. 8vo. Pamph.

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Introduction to Botany. By P. Wakefield. 12mo. Boston, 1811. *From W. H. Dall.*

An Account of the Fishes found in the River Ganges and its Branches. By Francis Hamilton. 2vols. 4to. Edinburgh, 1822.

Basaltic Mountains. 4to. *From Norman Easton.*

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Note sur les Moeurs des Bourdons. Par M. La Billardière. 8vo. Pamph. 1815.

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Charter and By-Laws of the Entomological Society of Philadelphia. 8vo. Pamph. Philadelphia, 1862. *From Samuel H. Scudder.*

A List of Animals dredged near Caribou Island, Southern Labrador, during July and August, 1860. By A. S. Packard, Jr. 8vo. Pamph.

Notes on the family Zygænidæ. By A. S. Packard, Jr. 8vo. Pamph. Salem, 1864.

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Öfversigt af K. Vetenskaps-Akademiens Forhandlingar. Vols. XVII–XIX. 8vo. Stockholm. 1860–62.

Nova Acta Regiæ Societatis Scientiarum Upsaliensis. Vols. I–IV. 4to. 1856–63.

K. Sächische Gesellschaft der Wissenschaften. Abhandlungen. Math.-Phys. Classe. Band VI. pp. 1–570. Berichte über die Verhandlungen. 1862. 8vo. Leipzig.

Entomologische Zeitung. Jahrg. XXIV. 8vo. Stettin, 1863.

Archiv des Vereins der Freunde der Naturgeschichte in Meklenburg. Jahrg. XVII. 8vo. 1863.

Schriften der Naturforschenden Gesellschaft in Danzig. 8vo. Pamph. 1863.

Der Zoologische Garten. Jahrg. IV, Nos. 7–12. Jahrg. V, No. 1. 8vo.

Wochenschrift des Vereines zur Beförderung des Gartenbaues. Nos. 31–51. 4to. Berlin, 1863.

Archiv für Naturgeschichte. 1862, No. 6. 1863, No. 3. 8vo. Berlin.

Wiener Entomologische Monatschrift. Band VII, Nos. 1–12. 8vo. Wien, 1863.

Berichte über die Verhandlungen der Naturforschenden Gesellschaft zu Freiburg, i. B. Band III. Heft. 1. 8vo. 1863.

Zeitschrift der Deutschen geologischen Gesellschaft. Band XV. Heft. 3. 8vo. Berlin, 1863.

Würzburger naturwissenschaftliche Zeitschrift. Band IV. Heft. 1. 8vo. 1863.

Physikalische Abhandlungen der K. Akademie der Wissenschaften zu Berlin. 1863. 4to.

Sitzungsberichte der K. B. Akademie der Wissenschaften zu München. 1863. Heft. 1–2. 8vo.

Jahrbuch der K. K. geologischen Reichsanstalt. Band XIII. Nro. 3–4. 8vo. Wien, 1863.

Neunundzwanzigster Jahresbericht des Mannheimer Vereins für Naturkunde. 8vo. Mannheim, 1863.

Nachrichten von der Georg-Augusts-Universität und der K. Gesellschaft der Wissenschaften zu Göttingen. 1863. 8vo. Göttingen.

Württembergische naturwissenschaftliche Jahreshefte. Jahrg. XIX. Heft. 1. 8vo. Stuttgart, 1863.

Verhandlungen des Naturforschenden Vereines in Brünn. Band I., 1862. 8vo. Brünn, 1863.

Abhandlungen der Naturforschenden Gesellschaft zu Görlitz. Band. I–II, III (Heft 2.)–VI. Die Regenverhältnisse Deutschlands. Abdruck aus den Band VII., Heft 1. Band VIII–XI. 8vo. Görlitz, 1827–55 and 1857–62.

Abhandlungen von der Senckenbergischen Naturforschenden Gesellschaft. Band V. Heft. 1. 4to. Frankfurt a. M. 1864.

Verhandlungen der K. Leopoldino-Carolinischen Deutschen Akademie der Naturforscher. Band XXX. 4to. Dresden, 1864.

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Mémoires de la Société Royale des Sciences de Liège. Tome XVIII. 8vo. Liège, 1863.

Actes de l'Académie Impériale des Sciences, Belles-Lettres et Arts de Bordeaux. 3e Série, 24e Année, 3e et 4e Trimestres. 25e Année 1e et 2e Trimestres. 8vo. Paris, 1862–3.

Journal de Conchyliologie. 3e Série. Tome III, Tome IV, Nos. 1–2. 8vo. Paris, 1863–4.

Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome VI, Second cahier. 8vo. Neuchatel, 1863.

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Mémoires de la Société Impériale des Sciences Naturelles de Cherbourg. Tome IX. 8vo. Cherbourg, 1863.

Bulletin de la Société d'Agriculture, Sciences et Arts de la Sarthe. 2e Série. Tome IX, Trimestres 1–3. 8vo. Le Mans, 1863–4.

Bulletin de la Société de Géographie. 5e Série. Tome VI. 8vo. Paris, 1863.

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Proceedings of the Royal Society. Vol. XIII, Nos. 58–62. 8vo. London, 1864.

Transactions of the Royal Scottish Society of Arts. Vol. VI. Part 3. 8vo. Edinburgh.

Transactions of the Entomological Society of London. 3d Series. Vol. I. Parts 8–9. 8vo. London, 1864.

Inaugural Address, by Prof. Owen. 8vo. Pamph.

Report of Proceedings of the Geological and Polytechnic Society of West Riding of Yorkshire. 8vo. Leeds, 1863.

Forty-third Report of the Council of the Leeds Philosophical and Literary Society. 8vo. 1862–3.

Relations of Science to Modern Civilization. An Essay, by Prof. H. Hennessy. 8vo. Pamph.

Memoirs of the Geological Survey of India. Palæontologia Indica. Series 2d, Part 6. Series 3d, Part 1. 4to.

Annual Report of the Geological Survey of India and the Museum of Geology for the years 1862–3. 8vo. Calcutta, 1863.

Transactions of the Royal Irish Academy. Vols. I–VI, VIII, X–XII, XVII, XVIII, Parts 1–2. 8vo. Dublin, 1787–1839.

The Reader. Nos. 54–76. fol. London, 1864.

Proceedings of the Royal Horticultural Society. Vol. IV, Nos. 4–7. 8vo. London, 1864.

Proceedings of the Royal Geographical Society. Vol. VIII, Nos. 1–2. 8vo. London, 1863–4.

Proceedings of the Berwickshire Naturalists' Club. Vol. IV, Nos. 5–6. 8vo. Alnwick.

Examination Papers of the University of Toronto. 4 Pamphlets. 8vo. Toronto, 1863.

Canadian Journal of Industry, Science and Art. Nos. 50–51. 8vo. Toronto, 1864.

Natural History Society of New Brunswick. Annual Report, 1863.

Fourth Annual Report of the Board of Agriculture of the Province of New Brunswick. 8vo. Frederickton, 1864.

Proceedings of the Academy of Natural Sciences of Philadelphia. 1864, Nos. 1–2. 8vo.

Smithsonian Institution, Annual Reports of Regents. 1862–3.

Smithsonian Contributions to Knowledge. Vol. XIII. 4to. Washington, 1863.

Smithsonian Miscellaneous Collections. Vol. V. 8vo. Washington, 1864.

Proceedings of the Essex Institute, Salem, Mass. Vol. IV, No. 1. 8vo. 1864.

Proceedings of the American Antiquarian Society at the Annual Meeting, held in Worcester, Oct. 21, 1863. 8vo. Boston.

Charter, Constitution and By-Laws of the Lyceum of Natural History. 8vo. New York, 1864.

Proceedings of the American Philosophical Society. Vol. IX. No. 70. 8vo. Philadelphia, June, 1863.

Annual Report of the Trustees of the Museum of Comparative Zoölogy, Cambridge, Mass., together with the Report of the Director, for 1863. 8vo. Boston, 1864.

American Medical Times. New Series. Vol. VIII, Nos. 18–26. 4to. New York.

Boston Medical and Surgical Journal. Nos. 1888–1896. 8vo. Boston, 1864.

California Farmer and Journal of Useful Sciences. Vol. XXI, Nos. 17–18. fol. San Francisco, 1864. *By Exchange.*

Iconum Botanicarum Index. Von. Dr. G. A. Pritzel. 2te Ausgabe. 8vo. Berlin, 1861.

Annals and Magazine of Natural History. Nos. 74–77. 8vo. London, 1864.

Bibliotheca Historico-Naturalis. Verzeichniss der Bücher über Naturgeschichte welche in den Jahren 1700–1846, erschienen sind. Von W. Engelmann. Band I. 8vo. Leipzig, 1846.

Bibliotheca Historico-Naturalis et Physico-Chemica, herausgegeben von Ernst A. Zuchold. Jahrg. I, Heft 1–2, (1851). IV, Heft 2, (1854). VII, Heft 1, (1857). IX, (1859). XIII, Heft 2, (1863). 8vo. Göttingen.

Quarterly Journal of the Geological Society. Vol. XX. No. 78. 8vo. London, 1864. *From Courtis Fund.*

Life of William H. Prescott. By George H. Ticknor. 4to. Boston, 1864.

New England Historical and Genealogical Register. Vol. XVIII, Nos. 1–2. 8vo. Boston, 1864.

The History of King Philip's War. By the Rev. Increase Mather. Also a History of the same War, by the Rev. Cotton Mather, with an Introduction and Notes by S. G. Drake. 8vo. Boston, 1864.

Early History of New England. By Increase Mather, with an Introduction and Notes by S. G. Drake. 8vo. Boston, 1864. *Deposited by the Republican Institution.*

September 21, 1864.

The President in the chair.

Thirty-six members present.

The Secretary read the Report of the last regular meeting, of two special meetings held since that time, and extracts from the memorandum of an agreement entered into between the Society and Dr. Wm. J. Walker, relative to the management of the Working Fund.

The President announced the sudden death, on June 26th, of one of the most promising of the younger members of the Society, Mr. Carleton A. Shurtleff, and read a letter from his brother, Dr. Augustine Shurtleff, presenting on behalf of his family, his papers and his collections, consisting principally of Insects and Plants, begging that the Society would view the gift in the light of a bequest from his brother.

Mr. S. H. Scudder offered a few remarks upon the character and scientific attainments of Mr. Shurtleff, and presented a paper by him upon "The general Plan of Venation in the Order of Insects and its modification in the different suborders," in which Mr. Shurtleff endeavored to show there were six distinct veins in a normal wing, which were coupled in pairs, forming thus three distinct areas, the first or anterior of which, was designed for strength, the second or middle for flight, while the third or posterior area was either supplementary to the second, or specially developed for specific purposes, as in the stridulating organs of the male Orthoptera. The veins of the first area arose from a side-piece on the thorax distinct from that which bore those of the third area, while the veins of the middle area did not appear to arise from either, but to be interpolated between them. Examples were cited throughout all the suborders.

The President read a letter from Mr. W. Brigham giving some account of observations on animal and vegetable life in hot springs in California. Prof. Wyman gave a résumé of published observations on this point.

The Corresponding Secretary read the following letters, viz:

From George W. Tryon, Esq., Philadelphia, acknowledging his election as Corresponding Member; the Secretary of the Convention of the Young Mens' Christian Associations, held in Boston, acknowledging courtesies received from this Society; the editor of the Annuaire des Sociétés Savantes, Paris, June 29, 1864, asking information concerning the Society; the Royal Society of London, May 16th, 1864, acknowledging the receipt of the Society's publications; the Superintendent of the Geological Survey of India, Calcutta, October 1st, 1863, presenting publications of the Survey; the Naturhistorische Gesellschaft zu Nürnberg, June 15th, 1864, presenting its Transactions; and the Académie Impériale des Sciences, Lyon, April 10th, 1863, presenting its Mémoires.

The following gentlemen were elected Resident Members: Messrs. James Tolman, Henry Edwards, Oliver Ames, Phineas E. Gay, Charles S. Kendall, Avery Plumer, Joseph Breck, George H. Homans, and William Endicott, Jr.

DONATIONS TO THE MUSEUM.

Sept. 21. Eighteen hundred dried plants, mostly from Brookline, Mass., six thousand five hundred dry, and two thousand two hundred and twenty-five alcoholic specimens of insects, twenty-six spiders, and twenty-nine myriapoda, one hundred and fifty native Chinese, and two hundred specimens of Japanese insects, thirty-two mammals and birds, thirty-six reptiles, seven fishes, fifty-two crustacea, fifty-one worms, eighty-five mollusca, forty-seven radiata, mostly from New England, bequest of Mr. C. A. Shurtleff; two skeletons of Galapagos tortoise from Galapagos Islands, by Dr. C. F. Winslow; lower jaw of sperm whale from the Coast of Peru, by Capt. P. Howland; twenty-seven specimens of rocks and building stones, by the Smithsonian Institution; tracks of *Cheirotherium* from Sorton Quarry, near Liverpool, England, by Capt. Anderson and Mr. George Moore; model in plaster of Mont Blanc and Chamounix, by Mr. H. B. Stanwood; two trilobites from Trenton Falls, three specimens of insects in Amber, fourteen spirifers, from the Potomac River, three miles below Aquia Creek, a fossil echinoderm; nest of *Chætura pelasgia*, from Burlington, Vt.; four uniones, from Fish Creek Ponds, Saranac Lakes, N. Y., by Dr. H. I. Bowditch; mollusca, from the Cretaceous beds, New Castle County, Del., by Mr. J. T. Rothrock; one hundred and seventy-five specimens of land and fresh water mollusca consisting of the following species: *Helix auricoma* Fér., *H. incrustata* Poey, *H. Brocheri* Gutierez, *H. emarginata* Gundl., *H. vortex* Pfr., *H. versicolor* Binn., *H. rubromarginata* Gundl., *H. minuscula* Binn., *H. Ottonis* Pfr., *H. Gundlachi* Pfr., *Helicina reeveana* Pfr., *H. elongata* Orb., *H. minima* Orb., *H. bellula* Gundl., *H. subglobulosa* Poey, *Cylindrella sexdecimalis* Jimeno, *C. sowerbyana* Pfr. var. *minor*, *C. irrorata* Gundl., *C. brunnescens* Gundl., *C. coronado* Arm., *C. variegata* Pfr., *C. blandiana* Gundl., *C. angulifera* Gundl., *C. Elliottii* Poey, *C. Wrightii* Pfr., *C. cærulans* Poey, *C. notata* Gundl., *Cyclostoma egregium* Gundl., *C. chordatina* Gundl., *C. textum* Gundl., *C. pudicum* Orb., *C. rugulosum* Pfr., *C. undosum* Gundl., *C.*

rotundatum Poey, *C. Pretrei* Orb., *C. scobina* Gundl., *C. perspectivum* Gundl., *C. latilabre* Orb., *C. Shuttleworthii* Pfr., var. *minor*, *Oleacina oleacea* Fér., *Macroceramus pupoides* Pfr., *Vertigo pellucida* Pfr., *Truncatella lineata* Poey, *Paludina bermudiana* Orb., *Stenogyra terebraster*, from Cuba, by Dr. Juan Gundlach: four skulls of birds, six jaws of fish, corals, mollusca, fossil bones, and seeds of plants, from New Orleans, La., by Dr. S. Kneeland; sturgeon's scale and shark's ray, fifty specimens of insects, from Lexington, Mass., by Mr. C. J. Sprague; specimens of granite, from Orange, Franklin Co., N. Y., by Mr. S. Rice; nest of Pencilled Grosbeak, by Mr. Luther Hill.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPT. 30, 1864.

On the Structural Character of the so-called Melanians of North America. By Dr. W. Stimpson. 8vo. Pamph. New Haven, 1864. *From the Author.*

The Law of Increase and the Structure of Man. By F. P. Liharzik. Prospectus. 4to. Pamph. Vienna, 1862. *From the Author.*

Synopsis of Canadian Ferns and Filicoid Plants. By George Lawson. 8vo. Pamph. Edinburgh, 1864. *From the Author.*

Revision of the Polyps of the Eastern Coast of the United States. By A. E. Verrill. 4to. Pamph. Cambridge, 1864. *From the Author.*

The Past and the Present. Semi-centennial address to the Alumni of Yale College, and Graduates of 1814, at their Annual Meeting, July 27, 1864. By Samuel B. Ruggles, LL.D. 8vo. Pamph. New York, 1864. *From the Author.*

Report of the Committee of the Overseers of Harvard College appointed to visit the Library for the year 1863; together with the accompanying documents. 8vo. Pamph. Boston, 1864. *From Harvard College.*

Directory of Pittsburgh and Alleghany Cities, the adjoining Boroughs, villages, etc., for 1864–5. By Geo. N. Thurston. 8vo. *From the Publisher.*

Letter addressed to M. Cordier, member of the Royal Academy of Sciences, on certain new Bone Caves. By Marcel de Serres. 8vo. Pamph. New Haven.

A Summer Cruise on the Coast of New England. By Robert Carter. 12mo. Boston, 1864. *From Samuel H. Scudder.*

Historical, Chemical and Therapeutical Analysis of the Principal Mineral Fountains at Saratoga Springs. By R. L. Allen, M. D. 24mo. Saratoga Springs, 1848.

The Empire Spring, its Composition and Medical uses. By E. Emmons, M. D. 16mo. Albany, 1849.

Quarterly Journal of Microscopical Science. Vol. VIII. No. 32. London, 1860.

Catalogus Floræ Ludovicianæ, auctore J. L. Riddell, M. D. 8vo. Pamph.

Contributions to Comparative Anatomy and Physiology. By Bennett Dowler, M. D. Nos. 1 and 4. 8vo. Pamph. *From Dr. S. Kneeland.*

Columbian Centinel, 1800–1801, 1812–14, 1816–28. 17 vols. fol. Boston.

Episcopal Recorder. Vol. X. fol. Philadelphia.

Boston Recorder, 1820–23. 4 vols. fol.

Boston Recorder and Telegraph, 1824–28. 2 vols. fol.

National Gazette and Literary Register, 1820–28. 8 vols. fol. Philadelphia.

Boston Daily Advertiser, July 1846–1848, July 1849–June 1850, 1851–March 1856. 18 vols. fol. Boston.

Daily Evening Traveller, July 1849–1855. 13 vols. fol. Boston. *From Dr. J. M. Warren.*

Anatomical, Pathological and Therapeutical Researches upon the Disease known under the name of Gastro-enterite, putrid, adynamic, ataxic or typhoid fever. By P. Ch. A. Louis. 2 vols. 8vo. Boston, 1836.

Anatomical, Pathological and Therapeutical Researches on the Yellow Fever of Gibraltar of 1828. By P. Ch. A. Louis. 8vo. Boston, 1839.

The London Medical Dictionary. By Bartholomew Parr, M. D. 2 vols. 4to. Philadelphia, 1819.

A Treatise on the Management of the Teeth. By Benjamin James. 8vo. Boston, 1814.

The Pharmacopœia of the Massachusetts Medical Society, 8vo. Boston. 1808.

Catalogue of the Recent Shells in the Cabinet of John C. Jay. 8vo. Pamph. New York, 1835.

Elements of the Practice of Physic. By George Fordyce, M. D. 8vo. London, 1771.

A Report on Spasmodic Cholera prepared by a Committee under the Direction of the Counsellors of the Massachusetts Medical Society. 8vo. Boston, 1832. *From Dr. J. W. Randall.*

List of the Specimens of British Animals in the Collection of the British Museum. Part. 5. Lepidoptera. 12mo. London, 1850.

Descriptions of the American Limacidæ. By Amos Binney. 8vo. Pamph.

Synopsis of North American Sphingidæ. By Brackenridge Clemens, M. D. 4to. Pamph.

North American Lepidoptera. Plate IX. Sphingidæ. Published by J. W. Weidemeyer, S. Calverly and W. R. Edwards. New York.

On the Darlingtonia californica, a new pitcher plant from Northern California. By John Torrey. 4to. Pamph. Washington, 1853.

Notes on new Species and Localities of Microscopic Organisms. By J. W. Bailey, M. D. 4to. Pamph. Washington, 1853.

Microscopical Examination of Soundings made by the U. S. Coast Survey off the Atlantic Coast of the United States. By J. W. Bailey. 4to. Pamph.

Microscopical Observations made in South Carolina, Georgia, and Florida. By J. W. Bailey. 4to. Pamph.

Observations on the Batis maritima of Linnæus. By John Torrey. 4to. Pamph. Washington, 1853. *By Bequest of C. A. Shurtleff.*

Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich. Jahrg. I–VIII. 8vo. Zürich, 1856–63.

Jahrbuch der K. K. Geologischen Reichsanstalt. XIV. Band. Nro. 1. 8vo. Wien, 1864.

Zeitschrift der Deutschen geologischen Gesellschaft. XV. Band, 4 Heft. XVI. Band, 1 Heft. 8vo. Berlin, 1863–4.

Abhandlungen der Naturhistorischen Gesellschaft zu Nürnberg. III. Band, 1 Hälfte. 8vo. 1864.

Proceedings of the Royal Geographical Society. Vol. VIII, No. 3. April, 1864. Announcement and Balloting List for Anniversary Meeting for May, 1864. 8vo. London.

Memorial to Lord Clyde. Extract from the Times of Saturday, April 2, 1864. 8vo. Pamph.

Proceedings of the Royal Horticultural Society. Vol. IV, No. 8. 8vo. London, 1864.

Proceedings of the Royal Society. Vol. XIII, No. 63. 8vo. London, April 1864.

The Reader. Vol. III, Nos. 77–78. Vol. IV, Nos. 79–81, 84–85, 87–89. fol. London. June to September. 1864.

The Canadian Journal of Industry, Science and Arts. New Series. No. 52. 8vo. Toronto, 1864.

The Canadian Naturalist and Geologist. Contents of First Series. New Series. Vol. I, Nos. 1–4. 8vo. Montreal, 1864.

Transactions of the Literary and Historical Society of Quebec. Session of 1863–4. New Series. Part 2. 8vo. Quebec, 1864.

Annals of the Lyceum of Natural History of New York. Vol. VII, Nos. 13–16. Vol. VIII, No. 1. 8vo. New York, 1861–3.

American Medical Times. New Series. Vol. IX, Nos. 1–10. 4to. New York. July–September, 1864.

Boston Medical and Surgical Journal. Vol. LXVI, Title Page. LXVIII, No. 18. LXIX, Nos. 25–26. LXX, Nos. 23–26. LXXI, Nos. 1–9. 8vo. Boston, 1863–4.

California Farmer and Journal of Useful Sciences. Vol. XXI, Nos. 20–24. Vol. XXII, Nos. 1–3. fol. San Francisco. June–August, 1864.

Proceedings of the American Antiquarian Society at the Semi-Annual Meeting held in Boston, April 7, 1864. 8vo. Pamph.

Proceedings of the American Philosophical Society. Vol. IX, No. 71. 8vo. Philadelphia, 1864.

American Journal of Science and Arts. Vol. XXXVIII, No. 113. 8vo. New Haven, September, 1864.

Proceedings of the Academy of Natural Sciences of Philadelphia. 1864, No. 3. 8vo.

Proceedings of the Essex Institute. Vol. IV, No. 2. 8vo. Salem. April–June, 1864. *By Exchange.*

Verhandlingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen. Deel XX–XXI. 8vo. XXII–XXVI. 4to. Batavia, 1844–57.

Transactions and Collections of the American Antiquarian Society. Archæologia Americana. Vol. II. 8vo. Cambridge, 1836.

Proceedings of the American Antiquarian Society, Annual Meetings of 1839–55. 8vo. Cambridge, Worcester and Boston.

Comptes Rendus des Séances et Mémoires de la Société de Biologie. 2e Série. Tome I. 8vo. Paris, 1864.

Journal of the Royal Geographical Society of London. Vol. XIV, Part 2. Vols. XX–XXI. 8vo. London, 1844, and 1850–51.

Proceedings of the Royal Irish Academy. Vol. I. Vol. V, Part 1. Vol. VI, Part 2. 8vo. Dublin, 1836–40, 1851 and 1855.

Erster Bericht des Offenbacher rereins für Naturkunde. 8vo. Offenbach a. M. 1860.

Bulletin de la Société Impériale des Naturalistes de Moscou. Année 1849, No. 1. 8vo. Moscou.

Proceedings of the Berwickshire Naturalists' Club. Vol. III. Vol. IV, Nos. 1, 2, 5. 8vo. Alnwick.

Archiv für Naturgeschichte. Jahrg. XXI, Heft. 2. 8vo. Berlin, 1855.

Mémoires et Documents relatifs à l'Histoire du Canada, publiés par la Société Historique de Montreal. 8vo. Montreal, 1859.

The Natural History Review. Nos. 1, 6 and 12. 8vo. London, 1861–3.

L'Investigateur. Journal de l'Institut Historique. 5e Série. Tome I. October and November, 1851. Tome IX. January–June and September, 1859.

Journal of the Geological Society of Dublin. Vol. IV, Part 2, No. 2. 1850. Vol. IX, Part 2. 1861. 8vo.

Journal of the Royal Dublin Society. Vol. II. Vol. III, No. 17. 8vo. Dublin, 1860.

Report of the Twenty-Eighth Meeting of the British Association for the Advancement of Science. 8vo. London, 1859.

Philosophical Transactions of the Royal Society of London. For the years 1831, 1836 (Part 1), 1843, 1845, 1847 (Part 1). 4to. London. *By Exchange with Smithsonian Institution.*

Annals and Magazine of Natural History. Nos. 78–80. 8vo. London. June–August. 1864.

Quarterly Journal of the Geological Society. No. 79. 8vo. London, 1864. *From Courtis Fund.*

October 5, 1864.

Mr. C. J. Sprague in the chair.

Thirty-one members present.

Dr. J. C. White exhibited under the microscope specimens of *Trichina spiralis*, and gave an account of recent discoveries which had been made in regard to it.

Mr. C. J. Sprague exhibited ripe apples from the tree growing in Lowell, which bore the peculiar blossoms shown by him to the Society at the meeting of June 1st. The same irregular arrangement of the pips was seen in the ripe fruit, they being racemose along the central axis. Some of them were developed at the end of the fruit, opening directly at the surface. The rudimentary green scales, to which the corolla was reduced in the flower, had taken on a succulent growth and become pulpy, like the rest of the fruit; while the sepals had withered and shrunk to their usual condition at maturity.

He also announced that *Calluna vulgaris* (the Heath,) had been found growing at Cape Breton, Nova Scotia, (specimens of which he exhibited,) thus disproving the negative arguments brought forward by him some time since to prove that it was not indigenous in this country.

Mr. F. W. Putnam remarked that all the fishes from the Milwaukee River presented this evening by Mr. Dall, were recognized by him, with perhaps one exception, as belonging to the same species as those found in Lakes Superior and Champlain; indeed, of all the forty or fifty species found in these Great Lakes only five or six were found in either, which did not occur in all, proving that we have but a single Ichthyological fauna through the whole region of the Great Lakes, including Lake Champlain. Until the present season he had thought that this "Great Lake fauna" had extended to the larger lakes in Maine; but, from his exploration of the Richardson chain, he was now convinced that such was not the case, as there were but three or four of the fourteen species of the Richardson Lakes, which were of the same species as those of Lakes Champlain and Superior. The absence of the Perch, Bream, Shiner, Pout, Pickerel and the Cyprinodonts, in the Richardson Lakes, was a marked characteristic of that fauna, distinguishing it from that of the Great Lakes.

A partial exploration of Sebago Lake, in Maine, showed that the fishes of that lake are of a different character from those of the Richardson chain, for of the fourteen species collected, the Chub and Red-fin only, were common to the two waters. In Lake Sebago, however, the fishes which have been mentioned as wanting in the Richardson Lakes, were found in abundance, with the exception of the Cyprinodonts. There were also a Lota and a peculiar species of Salmo found in Sebago, which were not found in the Richardson Lakes. As to Lake Sebago we do not yet know enough to say whether the fauna of this locality is identical with that of the Great Lakes or of New England. Certainly there were several marked differences between it and the New England fauna as now generally understood.

Dr. Pickering stated that he had passed the summer on the Androscoggin River, twenty-five miles from Lake Umbagog, the lowest of the Richardson Lakes, and that he had found the Chub abundant and the Pickerel was not rare. Perch had also been taken there for the first time during this season.

Mr. Putnam remarked in response, that the fishes of the Androscoggin River were different from those of the Lakes at its head waters, and that but few species passed from the river to the lakes. A species of Lota had been taken in the Androscoggin, but never in the lakes, so far as he was aware. The Eel had been occasionally found in the lakes at the "Upper Dam," but never in the lakes above that dam. In regard to the Eel, Mr. Putnam thought it was yet a question whether there was more than one species on our eastern coast, adjacent rivers and inland waters.

He stated that the Box turtle from Wilmington, Mass., presented by Mr. Holden, was the *Cistudo virginica*, which has a wide distribution on our continent east of the Rocky Mountains. There are several varieties which have been named, but these, Mr. Putnam was convinced, were only varieties and not species, as he had seen specimens with characters which rendered it impossible to consider them as belonging to one variety more than to another. Even as regards the three-toed variety of the South, he had seen two specimens which had three toes on one hind foot and four on the other.

The following persons were elected Resident Members:—Mr. Gilbert E. Pierce and the Rev. Warren H. Cudworth, of East Boston; Mr. Joshua T. Platt, of Cambridge; Messrs. G. F. H. Markoe and Henry D. Dupee, of this city.

October 19, 1864.

The President in the chair.

Thirty-five members present.

Capt. N. E. Atwood, of Provincetown, addressed the Society upon the habits of some of our salt water fishes. They might be divided, he said, into two classes: those which changed their homes in the different seasons from somewhat deep to shallow water, and those which might be termed migratory; not because they passed up and down the coast, but always came from the ocean depths beyond fishing limits, to the coast, and went back again, at the beginning and close of the warm season. He would only refer to one or two of this latter class.

He first spoke of the Mackerel.

These appear at the opening of spring, and are found abundantly along the coast in this vicinity, extending southward to the Delaware capes, below which they are rarely caught, though they are occasionally found as far south as the Virginia coast; northward they extend to the Gulf of St. Lawrence, and instances are known where they have been taken as far north as Bradore on the coast of Labrador. This can only occur during a season remarkable for the prevalence of westerly winds, for in the colder seasons they do not go so far north. They are found every year as far north as the Mecatina Islands on the Labrador coast. They make their earliest appearance at Provincetown, at the extremity of Cape Cod, about the 10th of May. The large individuals (which Mitchill described as a distinct species, but which Capt. Atwood considered but as the full grown adult,) appear first. These are all mature, no young accompanying them, and they never bite at a hook, which is the case also with all those found on the Labrador coast. Later in the season, the younger ones, which will readily take the bait, appear, and they are no longer taken with the net. The large individuals (*Scomber vernalis*) come about a week before they lay their spawn; one year when they appeared on the 20th of May, most of them were found to be laying their spawn on the 28th. By the 4th or 5th of June, the large mackerel disappear, and none will then be found but those not fully grown (*Scomber grex* Mitchill). In thirty days from the laying of the spawn the young mackerel, about two inches long, will be found in great abundance, and in fifty-five days, they will have reached the length of four inches.

The *Scomber grex* is fished for with the hook. Forty years ago the fishermen used to fish during the entire summer off of soundings, and out of sight of land, both off our coast and on the fishing ground lying entirely to the eastward of Cash's Ledge. But this ground failed altogether in 1842, and now most of the fishing is done *upon* Cash's Ledge, which is seven leagues long by two broad, with a shoal spot near the middle about a quarter of a mile long; at this small spot most of the mackerel would be taken, and there would sometimes be as many as one hundred sail of vessels upon it.

This year no mackerel were taken in August; early in September some were caught at Boon Island Ledge, to which place the fishermen flocked. The fishing lasted about a week, and many thousand barrels were taken just at the ledge; and though occurring in such abundance at this point, not one could be taken half a mile off. After this they were caught near Minot's Ledge.

About the middle of November, the fishermen of Provincetown Bay begin to put out nets for the large mackerel (*Scomber vernalis*), on its return. On one occasion Capt. Atwood had twelve nets out, five miles from land; on the last night of November he had taken nothing, but on visiting the nets the next day he found they had sunk to the bottom filled with mackerel. He however succeeded in getting up eight, and the nets as they came to the surface looked like a sheet of silver: 3,360 mackerel were taken from these eight nets by nightfall; the next day the remaining nets were dragged in and 1,700 more taken, making over 5,000 fish netted at a single "catch." On another occasion a "catch" lasted three nights, when he alone caught mackerel of the best quality, enough to make sixteen barrels when packed.

The fishermen divide the mackerel into four classes, according to their size, which are termed respectively, "large," "second size," "tinkers," and "blinks." There is a clear line of demarcation between them, so that every fisherman can separate the same size of fish in the same way; from this fact Capt. Atwood believes that it takes the mackerel four years to attain its growth.

The next fish Capt. Atwood alluded to, was the Menhaden (*Alosa Menhaden*). They arrive at Provincetown a little sooner than the mackerel, making their earliest appearance in immense numbers; unlike the mackerel, which become plentiful by degrees. The fishermen never find any spawn in them; in September small fry, four or five inches long, are seen. Most of the menhaden pass off late in autumn, but some, which are probably still to be found up the creeks, do not disappear till towards January. Some of these, taken late in December, he sent to the Museum of Comparative Zoölogy, Cambridge, and Mr. Putnam found mature spawn in them. From these circumstances, and from the fact that the half grown fish are known to the negroes of the Virginia coast by the name of "bug-fish," because they believe them to have been produced from insects, since they never find spawn in them there, Capt. Atwood believed that they spawned in the winter on the shoals off shore between Nantucket and Cape Hatteras. From the circumstance that only two sizes, the large and the small menhaden are ever seen, he further deduced the fact that this species attains its growth in a single year.

In reply to a question of Mr. Putnam's relative to the spawning of eels, Capt. Atwood said he had never been engaged in the eel fishery, and that very few were found in Provincetown, but that the young ones were to be seen in the spring.

Mr. S. N. Chamberlain stated that he had found the spawn in eels brought to market for about three weeks in October, to be mature, but very small.

The President exhibited a specimen of "Bull-dog Cod," being a deformed individual of the common species of cod and made some remarks upon the character of the malformation of its head.

Capt. Atwood stated that this monstrosity was found, so far as he was aware, only in Labrador, and was not uncommon there.

Mr. Putnam said that Mr. Sceva had recently presented a Cunner, *Ctenolabrus cœruleus*, having this same malformation of the snout. Mr. Putnam had brought this summer from the lakes in Maine, two specimens of trout similarly distorted.

Capt. Atwood presented two deformed claws of lobsters, in which Prof. Wyman stated the same principle prevailed as in recorded cases of monstrosities in Vertebrates.

Capt. Atwood remarked that the "larger claw" of the lobster was found equally on either side.

The following gentlemen were elected Resident Members: Mr. David S. Greenough, of Jamaica Plain, and Mr. Copley Amory, of Boston.

November 2, 1864.

The President in the chair.

Thirty-six members present.

Dr. C. F. Winslow presented two skulls, together with two stone pestles and a mortar, which he had obtained from a sepulchral mound which covered a space of half an acre near Stockton, California. The mound was nearly filled with implements and with the skeletons, which were found lying in a horizontal position.

He also presented some fish, a sepia and some lizards, from the Bay of Paita and vicinity, and some insects taken during a journey from the borders of Ecuador to Quito, together with an annelid taken at the height of seven to eight thousand feet, and two small frogs found at the height of nine thousand feet above the sea.

With regard to the stone implements found in the mounds in California, Dr. Winslow stated that he had been informed that it was the invariable custom of the Indians to break them when burying the dead. Both of these were broken, but he was rather inclined to think that in one there was a fresh fracture. The mounds at Stockton resembled in character those found in South America, north of Pachacamac, which, with those about it, were square structures built of adobes.

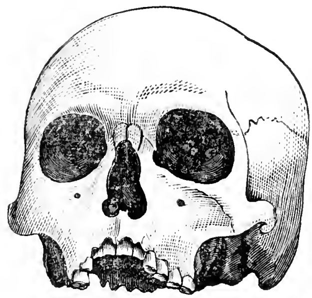
Dr. J. C. White remarked that these skulls were very interesting, since the discovery of burial mounds in California was new, or had never been noticed by Ethnologists, and the skulls themselves, though of undoubted Indian character, were not like those of the Atlantic States or any he had ever seen. He read the following

Description of two Human Skulls recently brought from Stockton, California, and presented to the Society by Dr. C. F. Winslow.

They were obtained from a large burial mound at that place, which contained, beside these specimens, the bones of many other individuals and broken stone ware. The existence of burial mounds at this latitude upon the Pacific coast has never before been observed. One of the crania (No. 1054 department catalogue) was in a perfect condition with the exception of the loss of a few teeth, and was evidently of the male sex. A superficial examination revealed very remarkable points, and gave the impression of an exceedingly low type of development. The superciliary ridges are very strongly marked, and form, at the median line, a prominence which projects boldly above the nasal bones. The frontal region is very narrow and extremely low, and the zygomatic arches so prominent as to allow half an inch of the temporal fossæ to be seen when the skull is held at arm's length. The parietal regions are widely separated and bulging, and the contour, seen from above, strikingly resembles a jug, (Fig. 2) the strongly developed zygomatic arches furnishing the semblance of handles. The occiput is broad and rounded.

The face is massive and decidedly prognathous. The nasal bones project in the form of a sharp ridge. The shape of the nasal orifice is that of an elongated triangle. The character of the skull, which is perfectly symmetrical and presents no appearances of artificial distortion, resembles that of the "Digger" Indian, but one of a much more degraded type.

Fig. 1.



The measurements are as follows:

Longitudinal diameter	7.4 inches.
Parietal "	5.8 "
Frontal "	4.4 "
Vertical "	5.0 "
Intermastoid arch	15.5 "
" line	4.0 "
Occipito-frontal arch	14.4 "
Horizontal periphery	20.5 "
Length of head and face	8.4 "
Zygomatic diameter	5.7 "
Internal capacity	80 cub. inches.

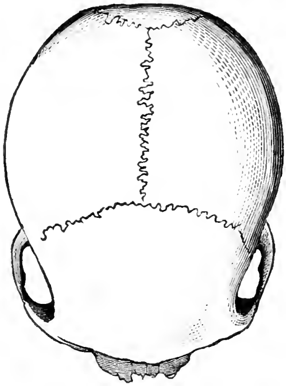
A longitudinal section * (Fig. 3) shows more strikingly than an external view the low development of the anterior central lobes and the great projection of the superciliary ridges. Posteriorly the internal capacity is large. The parietes are solid and thick.

The other specimen (No. 1055), probably a female, was broken into numerous fragments, but has been restored sufficiently to be measured. The general form of the skull is the same as that above described. The frontal region is not quite so low, nor are the superciliary ridges more prominent than in many skulls of the red man. The parietal regions are more flattened and form a pyramidal vertex. The nasal bones are nearly flat, and give, with the projecting por-

* The artist has not drawn the projection of the superciliary ridge with sufficient prominence.

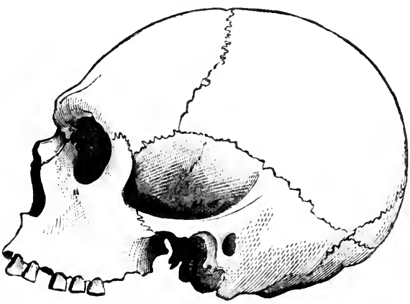
tions of the supra-maxillaries, a great breadth to the interorbital region. The zygomatic arches also in this specimen are strongly developed.

Fig. 2.



Longitudinal diameter	6.8	inches.
Parietal "	5.5	"
Frontal "	4.1	"
Vertical "	5.0	"
Intermastoid arch	14.4	"
" line	4.0	"
Occipito-frontal arch	14.0	"
Horizontal periphery	19.2	"
Length of head and face	7.8	"
Zygomatic diameter	5.2	"

Fig. 3.



Dr. Wyman remarked that in the mounds of the Atlantic coast, the vessels are invariably broken, though in those of the central States, they are found whole; to which Mr. Alexander Agassiz added his testimony, stating that in those he had seen in the neighborhood of San Mateo, California, he was able to find but a single mortar, the bottom of which was not broken out.

Dr. C. T. Jackson presented to the Society some specimens of iron ores from the northern end of Staten Island, where a large deposit of the ore exists, and has been wrought to some extent, upwards of seven thousand tons of it having been made into good cast iron.

This ore was found on the old manor of Thomas Durgan, the first British Governor of the Colony of New York, now belonging to Cornelius Du Bois, Esq.

The ore is a singular concretion of rounded grains of magnetic chromiferous iron ore, the rounded grains giving the mass the appearance of a pisolite or oolite, being made up of concentric layers with radii diverging from their centres, and the whole being imbedded in a paste of compact brown peroxide of iron, or hæmatite.

On chemical analysis the ore was found to yield

	No. 1.	No. 2.	
Water	12.5	12.5	
Silica	25.0	9.0	
Oxide of chrome	16.0	16.0	
Peroxide of iron	47.0	63.0	= iron = 44.1.
	100.5	100.5	= gain oxygen.

This ore does not make strong bar iron, but very good cast iron, according to reports of iron masters who have worked it.

He also presented specimens of argentiferous Galena and Copper Pyrites, with the dressed Copper and Lead ore prepared from them, from Middletown, Ct., and also a specimen of prepared peat from Lexington, Mass.

He remarked that some economical method of converting the extensive bogs of peat which abound in our northern States into good fuel, both for the range and stove, as well as for the reduction of iron ores, had long been desired. In the ordinary desiccation of cut peat the fibres of the sphagnum prevent its contraction into solid masses, and it is so porous that it is also difficult to extinguish when converted into charcoal. Compression has been tried in vain, as the pulpy peat was forced out from the bags and machines. Drying by fire cost more fuel than the peat was worth, and hence the enterprise was generally abandoned.

Recently, however, it has been discovered that if the sphagnum fibres were removed from the pulpy peat, it could be dried in the open air or under sheds with glazed roofs, and that the peat then became perfectly solid and nearly as hard as horn, thus becoming suitable for fuel, and much better for the smelting of iron, being easily convertible into very solid charcoal of sufficient firmness for the forge or furnace. The fibre is removed by two different kinds of machinery. The first was an English machine, consisting of a cone revolving in another cone pierced like a cullender, the peat in fine pulp being forced out in ropy masses of the size of a man's little finger, while the fibre was cut up fine. The other is an American invention, due to two Boston mechanics, consisting of a series of combs which comb out the fibre, after which the fine peat is forced by an endless screw through a tube, from which it issues in a large cylindrical mass five inches in diameter, in a continuous stream. This is spread on boards and cut into squares like bricks, and allowed to dry partially in the open air, and then under glazed sheds, until it becomes very compact and hard as horn, when it can be used for fuel in the place of coal. It is also advantageous to have this fuel in regular brick-like forms, since it packs compactly on board steamships and no space is lost by vacuities.

This peat fuel contains no sulphur, and is found to be the best fuel for annealing iron wire, especially for piano-forte wires, and is also unobjectionable for furnace uses, as it does not, like coal, contain sulphur that would tend to deteriorate the iron. Anthracite dust is also to be worked into this fuel for furnace uses and may thus be economized. A patent has been granted to parties in this State for this improvement.

The manufactory of peat fuel is now in operation in the town of Lexington, twelve miles from Boston, with every prospect of success, and I have no doubt that many of our great peat bogs will soon have the requisite machinery placed near them, and that a large supply of this valuable fuel will soon be in our market in competition with the coals of Pennsylvania and Nova Scotia. At the collieries of Pennsylvania millions of tons of fine screenings of Anthracite are piled up around the mines. This coal dust, before useless, will soon find a market at the north for mixing with our peat.

I have seen good gun-powder made from peat charcoal, and I have made blasting powder suitable both for civil and military mining, by mixing peat with a saturated solution of boiling nitrate of soda, and then stirring in pulverized sulphur, by the same process that blasting powder is made of waste tan bark in Belgium.

Dr. A. A. Gould read from an English paper, that portion of the address of Dr. Gray before the Zoölogical section of the British Association for the Advancement of Science at its recent meeting in Bath, which treated of public museums and their arrangement; and a discussion of this subject followed, in which Dr. White and Messrs. A. Agassiz and Scudder participated.

Mr. George Sceva remarked in relation to the skeletons which the Society had acquired within the past few years, and which had lately been mounted by him, that particular pains had been taken in articulating the bones, to insure their greatest usefulness, while at the same time all unnecessary expense had been avoided, such as using costly platforms with brass standards for mounting the specimens. Great care had been taken in drilling the holes for the wires, to make them small and few in number, retaining the bones in place, and the ends of the wires in many parts of the skeleton instead of being turned over several times forming a large curl, had been fastened by simply turning the end of the wire back upon itself, which he believed to be stronger and of considerable advantage in affording a better view of the small bones of the extremities. He had also endeavored to mount the skeletons so that a part, or the whole, might be easily disarticulated, and the bones studied separately.

In relation to having a number of specimens representing several species of the same genus mounted and placed together on exhibition, Mr. Sceva thought that where space could be afforded, in many studies requiring special investigations in Osteology, the examinations and comparison of bones could be made with greater facility by having them mounted as mentioned above, than by storing them in drawers or boxes.

In illustration of the convenience of the former arrangement he mentioned that in one of the large cases in the Society's Museum, containing seven of the larger species of the genus Felis, the student would find, on examining the tarsal bones, that the first metatarsal, which is rudimentary in the cats, was coalesced with the internal cuneiform on both feet of one of the specimens, and in another of the same species, the bones had united on one side and were separate on the other; while in the other specimens they were all separated. Such examinations could be made in a few moments, while it would occasion a considerable loss of time, besides the injury to the bones by frequent handling, if they were placed promiscuously in drawers.

Mr. Samuel Hubbard, of San Francisco, was elected Corresponding Member.

Dr. George T. Moffat and Mr. A. M. Shurtleff were elected Resident Members.

November 16, 1864.

The President in the chair.

Twenty-seven members present.

The Secretary read a letter from Mr. Charles L. Swasey, of New Bedford, communicating the intelligence of the capture of a species of shark in the harbor of Marion. It measured thirteen feet long, the body being six feet and the tail more than seven feet long, and weighed four hundred pounds. A figure accompanied the letter. The President stated that it had been occasionally taken on our coast and was called the Swingle-tail (*Alopias vulpes*).

Dr. C. F. Winslow presented a number of fossil bones and teeth, entire and in fragments, of various unknown animals taken by him a few miles south of Riobamba during his late exploration in the equatorial Andes, and in presenting them, pointed out the locality on his maps, and read the following extracts from his Journal. Dr. James Taylor of Riobamba accompanied him, and Dr. Winslow thus describes the journey:

Riobamba, Tuesday, May 31, 1864. At seven o'clock we started upon our excursion to the ravine of Tungshi, about eight miles distant to the southward, a spot nearly opposite Punin, where large deposits of fossil bones have for some years past been known to exist. We followed the road by which I came to the city until we arrived at the foot of the Kuuté — a high and steep dividing ridge between the Cordilleras — when we took the direction toward Punin, and leaving that town on the right, descended into and crossed an immense ravine. Following up its left bank we at last descended again by a difficult path, and tied our beasts near the bottom of the ravine of Tungshi to a few bushes that grew along its desolate side. We then crossed the stream and climbed up the steep cliff. By clinging to the rocks I could pass round a sharp point, and ascending the precipice two or three hundred feet by sloping zigzag indentations worn out by the rains, I came to a place where the descent was easy to the spot where the bones had been previously found. This was some three hundred yards from the spot where we had tied our mules.

The bones, either entire or in fragments, laid promiscuously in a very compact hard silt or brown fine gritty mud, and the bottom of the ravine where we could work in excavating them was at least five hundred feet from the top of the cliffs which formed the edges of the ravine. The ravine was formed by the action of running water, and the further we ascended the chasm the deeper and narrower it became, and the more perpendicular were its sides; for it was formed in a steep declivity which ran upward and eastward towards the mountains which in this direction were very lofty, and formed the snowy crests of the eastern Cordillera of Cubillin. The small stream which ran at the bottom of the ravine had cut its way down to hard compact quartzose sandstone. The bed of the stream was filled with boulders of porphyry and other igneous rocks, and I observed several boulders which appeared to be granitic. Upon this hard, flinty sandstone rested this immense thickness of compact silt or gritty mud which contained bones, mostly in good condition. A stone was only here and there to be seen, and these were small and rounded. But the bones were numerous all the way from the bottom of the ravine to the height of a fourth or fifth part of the altitude of the cliff on both sides, and I observed them even three hundred yards below our excavation and near the spot where we had left our mules.

Dr. Taylor visited this spot with some travellers five years since, when he saw some very large bones imbedded in the cliffs which he could not reach. He represents one of them to have been the os innominatum of some gigantic animal, and that the articulating point of the bone was as large as his hat. Afterwards, more than three years since, Garcia Moreno, the present chief magistrate of the Republic, either visited the place, or hearing of huge and curious bones existing in these deposits, ordered them taken out and removed to Quito.

We spent some two hours or more in excavating, and I have obtained many whole bones or fragments, and four different forms of teeth. The bones and teeth are mostly in excellent preservation, and their future examination by comparative anatomists may add important data for our study of the former life and the geological changes which have taken place in the heart of the Andes.

About two hundred feet above the place where we excavated the bones, the ravine became so narrow that it was not more than six feet wide, and its sides were perpendicular, the stream filling the whole width so as to render a further penetration into the chasm impossible Some days after this record I became acquainted in Quito with Mr. Ignacio Lezarzaleuru, who informed me that he was one of President Garcia Moreno's party who some years previously took out of the cliff the skeleton of the mastodon, fragments of which were presented to me by Vincente Espinosa, LL.D., and governor of the Province of Riobamba, and which I have presented to this Society; and Mr. Lezarzaleuru farther stated that he explored the upper parts of these cliffs very thoroughly, and observed the bones throughout the entire thickness of the silt, which he judged to be six hundred feet thick, and thought them more numerous in the upper portion than in the lower.

The silt in which these bones are found is not stratified nor laminated in any place exposed to view, but is a solid mass of immense thickness, and the bones lie in all directions, and at all angles and inclinations. The silt is very compact, and it required as much work to separate the bones from the material in which they were impacted as if it had been sandstone.

June 1. Having to-day been introduced to Governor Espinosa, my attention became engaged while in his study with the fragments of gigantic bones which he had taken from the ravine of Tungshi several years since. They came from the same spot which I visited yesterday. He informed me that the skeleton of the animal appeared to be complete and that the bones protruded from the cliff about twenty feet from the bottom of the ravine. The bones had been given away and lost; and he presented me with the last in his possession. The femur (probably of a mastodon,) the lower fragment of which I present to the Society, had been broken in two pieces.

The length of the larger fragment was just eight and one quarter inches, and its largest diameter was seven and three-eighths inches, its short diameter about four inches.

Dr. A. A. Gould said that there had been, and still was, great diversity among conchologists in the application of terms in the description of shells, especially in regard to those of dimension, they being often used in directly opposite senses. He considered that a correct and uniform use was possible, since the consideration of the animal had come to be combined with that of the shell by referring the terms to the related position of the animal.

Taking a common clam for an example, and placing it with the beak uppermost, he showed the position of the enclosed organs, and that the extremity which was in front during locomotion should be called the *anterior*, and the opposite, the *posterior* extremity; that the distance from the beak to the opposite margin should be called the *altitude*, the distance from the anterior to the posterior extremity, the *longitudinal diameter*, and the distance through from one valve to the opposite the *transverse* diameter; that the concentric markings of growth should be called *longitudinal*, in distinction from those which radiated from the beak to which the name of *vertical* should be applied. The terms equilateral, posterior side and anterior side, as used, he showed to be peculiarly improper, and suggested instead the terms *equipartite*, *posterior part*, *segment* or *section*, etc. Passing then to the common spiral shells through the medium of Limax, Patella, Dentalium, and Vermetus, he showed that the radiating or spiral striæ in like manner should be denominated *vertical*, and those which crossed the single whorls or the concentric lines of growth *longitudinal striæ* — that in reality the longitudinal diameter of a shell was the width of the largest whorl at its aperture, and its altitude the length of the unrolled spiral, and thus the terms used in the description of all shells become identical for analogous parts. For convenience however, we may speak of the altitude of the *spire* as distinct from that of the *shell*, and so of its length; the anterior extremity and other relative terms were to be determined in this as in the other instances, by the relation of the shell to the animal when in motion; and the parts enclosed by the spiral shell should be regarded as simply a hernia of the viscera through the back of the animal.

There were other terms also, which he showed to be unsuitable, having been derived from a false idea of use, or from a fanciful analogy. Thus the mouth and throat and teeth and lips of a shell are spoken of, which terms might be allowable, were it not that there is an animal in all cases which should properly be considered in the full description, and which has all these parts performing their legitimate offices. He pursued the subject in this direction with various examples and suggestions.

The Custodian announced the presentation of a series of thirty-three casts of Mexican masks from the Smithsonian Institution, which were exhibited on the table.

Mr. C. C. Sheafe remarked that he had recently been making some experiments with Borax as a means of driving away our "water bug," the *Ectobia germanica.* He had placed two specimens in a bottle with a couple of drachms of the powder, and found them both dead, one at the end of twenty-four and the other after thirty-eight hours confinement; by sprinkling half a pound about his house he had quite driven them away.

Messrs. William R. Dimmock and Stillman E. Chubbuck were elected Resident Members.

December 7, 1864.

The President in the chair.

The following communications were read:

Remarks on some facts connected with the Development of Frogs, observed at Waterville, Maine, by C. E. Hamlin.

In accordance with a suggestion made to me by Professor Agassiz, I have observed a few facts relating to the development of Frogs in this vicinity, which I beg leave to present to your notice.

In the first two weeks of June last, among very small tadpoles, evidently produced from the egg since the opening of spring, a few individuals were found of three inches or more in length, and having the body and posterior limbs so well developed that it seemed improbable that so great an amount of growth had taken place since the close of winter. I was inclined to consider them to be the young of the previous year.

During the fall of this year, from October 5th to November 10th, great numbers of small tadpoles were noticed in several different places where water had been abundant throughout the season. Of these I made collections on October 12th, 17th, 22d and 31st, and again on November 10th. The specimens taken on October 12th measured from one to one and three-quarters inches in total length; and in the largest of them the hind legs were but minute *buds.* Specimens taken from the same pools, on October 31st and November 10th, show an increase of about half an inch in average length, and the rudimentary legs were a little larger. On these last two dates six specimens were taken that had attained a length of three inches. The legs of these were half an inch long, with all the toes readily distinguishable. But in none of the fall specimens, nor in the largest of those collected in the first eleven days in June, were there any external indications of anterior limbs. Between October 31st and November 10th, a week of sharp cold intervened, during which thick ice formed upon still water. Three successive days of warm rain followed, and on November 10th I found the tadpoles very lively in the ditches from which most of my specimens were taken. On the 13th, snow fell and remained to the depth of several inches. The subsequent cold probably drove the tadpoles into permanent winter quarters.

From the foregoing facts I infer that at least a part of the young of one or more species of Frogs are, in this vicinity, overtaken by winter before completing their changes, and that having hybernated as *tadpoles*, they resume their development with the return of spring. And as I have found so late as October 17th, salamanders still retaining their gills, the same is probably true of some species of our Urodela.

On a Habit of Certhia americana supposed to have been hitherto unnoticed by Authors. By C. E. Hamlin.

In January, 1863, while searching in the woods of Waterville for winter birds, I observed a habit of *Certhia americana* which has not been described by any naturalist, so far as I can ascertain.

I stood watching the peculiarly nimble motions of six or eight Brown Creepers as they ran up the trunks of the tallest beeches and maples, and saw them repeatedly fly from the tops of trees which they had examined to the foot of neighboring ones, in the manner described by ornithologists. In two cases, however, individuals, not seeming satisfied with the search they had already made, commenced it anew. But instead of running downward from the top of the trunk, as is the well known habit of the Nuthatches, each of the two referred to dropped perpendicularly, for twenty feet or more, with closed wings to the foot of the tree up which it had just been climbing, and, when close to the ground, darted aside to the trunk and ran upward again.

Happening in both instances to be quite near the performers of this singular feat, I saw the manner of executing it perfectly; and as three of the birds were shot and identified, there is no doubt about the species. I have found this bird here only in the fall and winter.*

Dr. C. T. Jackson presented some specimens of carboniferous plants from the Wyoming coal basin in Pennsylvania, making a few remarks upon their position. He also pre-

* Since writing the above, I find that Gosse (Birds of Jamaica, p. 135,) ascribes the same habit of dropping vertically downward, upon the wing, to *Mniotilta varia.*

sented on behalf of M. Élie de Beaumont, two pamphlets on his pentagonal system of mountain chains, taking occasion by the donation to urge on American Geologists the study of Beaumont's system.

Captain N. E. Atwood exhibited and presented the lower jaw of a large shark, of which only one or two specimens have hitherto been taken. One, obtained some years since, is in the Museum of Comparative Zoölogy; and another, taken in the Gulf of Mexico, was given to the State Cabinet, and the third, captured at Provincetown, and now presented, proved on comparison by himself with the one from the Gulf of Mexico, to be the same, and an undescribed species of Carcharias.

In the stomach of this specimen, nearly the whole of a full grown sword-fish was found, and some ten or twelve wounds in the skin of the shark, giving evidence of the contest which must have occurred, and establishing the identity of the victim. He suggested the specific name of *tigris* as an appropriate designation for this shark when it should be properly described. At present nothing could be said of the colors and form of this shark other than that it was blue on the back and white on the belly.

Captain Atwood continued with some account of other sharks, presenting the jaws of a male and female Dog-fish, (*Mustelus canis*). This shark, he observed, was the most common one upon our coast. He had seen it at Gay Head, Martha's Vineyard, but knew nothing further about its southerly limits. Both above and below Cape Cod it was abundant, and was found all along the coast of Massachusetts, Maine, Nova Scotia and the Gulf of St. Lawrence. He had never himself seen them further north than the Magdalen Islands and the east coast of Cape Breton Island, but reliable accounts say that it is found on the southern coast of Newfoundland.

As the Dog-fish appear at Provincetown a little while after the mackerel, of which an account was given at a previous meeting, and disappear shortly before them, he judged that they probably needed warmer water than that fish, and therefore do not probably go quite so far north.

When they first appear, they are in great abundance; the females always excel in numbers the males, but in the early part of the season all are females, and all have young in some stages of development, though not in every stage, there being seldom any between the young just forming, and those nearly grown. The gravid females may be found with the young in some stage of development during the whole season.

The mature male weighs five or five and a half pounds, rarely as much as six pounds, while the female attains the weight of eight or eight and a half pounds. In spring they are poor, and their liver is of a dark color and lean, but in autumn it is quite fat and large, and the amount of oil does not increase proportionably with the enlarged size of the liver, but rather decreases. In the Gadidæ, on the contrary, the liver when in poor condition affords no oil. Fat is also found in the flesh of the Dog-fish which is sometimes used for fuel, burning well, when dried,—as was proved by a sample before the Society,—while the Goose-fish or Lophius, has little or no fat either in the flesh or liver. The part remaining after the extraction of the oil from the liver is called "gurry" by the fishermen.

In reply to a question by Dr. C. F. Winslow, Captain Atwood stated that he did not know to what extent sharks possessed the sense of smell; but they could distinguish between fresh and stale bait. The blue-fish is an excellent bait for dog-fish when fresh, but when salted or stale, is eaten by them but sparingly.

Dr. Winslow said that some dissections he had made some years since showed that the olfactory organs were well developed in sharks.

Dr. Pickering asked how it was possible for the shark to capture a sword-fish, which was a much swifter animal. Captain Atwood replied that the mackerel was caught by the hake, a much slower fish.

In reply to a question of Dr. J. B. S. Jackson about the thrasher shark or swingle-tail recently exhibited in Boston, Captain Atwood said that they were abundant at Provincetown, though not so common as Lamna punctata. He also observed that he placed no confidence whatever in the stories current of attacks on the whales by the thrasher, believing them to be quite harmless, and unable to hurt a dolphin,—the story very likely arose from some peculiar movements made by the hump-backed whale. Sword-fish he believed might attack a whale and kill him, from what he had seen of the force of their thrusts into the bottoms of vessels, though he has no evidence that they ever do attack them; he was not aware either, that the thrasher ever uses his tail for offensive purposes.

Mr. Andrew T. Hall alluding to the use of borax in driving away insects, as referred to in the report of the last meeting, stated that chloride of lime was an effectual agent in driving rats from vessels overrun with them.

Dr. J. C. White exhibited a piece of the organic tissue of the elephant found imbedded in the ice at the River Lena, Siberia, in which certain cells were seen under the microscope to be as well preserved as in common dried animal tissues. The specimen was presented to the Society by Dr. Walter Channing.

Dr. White presented, in the name of Mr. Todd, a fragment of the lower jaw of a moose to all appearances fossil, found on the surface of the soil at Lake Superior; and the skull of a polar bear of an unusually large size taken sixty days ago in Hudson's Bay, and presented by Mr. W. M. Thorup of New Bedford. With this were exhibited skulls of a grizzly and brown bear, together with a cast of that of the extinct cave bear of Europe, and some of the characteristic distinctions between them were pointed out.

Dr. Winslow presented the remainder of the bones taken by him from the same locality in South America as those exhibited at the last meeting; the complete series were referred to Dr. Wyman for examination.

Rev. Mr. Eddy exhibited some specimens of Anastase from Smithfield, Rhode Island, for the first time discovered in this country.

Prof. A. E. Verrill stated that he had succeeded in preparing star-fishes with their natural colors perfectly preserved, simply by immersion in weak alcohol a sufficient length of time to kill the animal, and then to dry rapidly by artificial heat.

The Secretary also made a statement on behalf of the Publishing Committee, relative to efforts making to obtain subscribers sufficient to warrant the Council to direct them to resume publication. He stated that the Journal would now be published in quarto under the style of Memoirs, and that the Proceedings would no longer be issued to the Members free of cost. It would be necessary to obtain two hundred subscribers to the Memoirs at three dollars and fifty cents per number, and three hundred subscribers to the Proceedings at three dollars per volume, before commencing again. A subscription paper and circulars were placed upon the table.

Messrs. Henry P. Quincy and Charles W. Kennard were elected Resident Members.

December 21, 1864.

Vice President C. T. Jackson, M. D., in the chair.

Thirteen members present.

The following paper was read:

DISCOVERY OF EMERY IN CHESTER, MASS. BY CHARLES T. JACKSON, M. D.

It has been said in England that "a good mine of emery is worth more to a manufacturing people than many mines of gold." This being undoubtedly true, it affords me great pleasure to be able to announce the discovery of an inexhaustible locality of excellent emery in the middle of the State of Massachusetts, in the town of Chester, in Hampden county, within three-fourths of a mile of the Western Railroad, and twenty-seven miles from the Springfield armories and machine shops.

For more than two years the existence of important beds of Magnetic iron ore has been known in the mountains of Chester, and Dr. H. S. Lucas, who originally discovered and secured them, sought the aid of Boston capitalists in mining and smelting the ore.* In consequence of this agitation I was sent by John B. Taft, Esq., on the 19th of October, 1863, to examine the locality, and to report to him the results of my explorations. Large and rich beds of magnetic iron ores were discovered, and one bed had so remarkable an appearance as to excite my doubts as to its being really a pure iron ore. I brought specimens of it and of the associated minerals home for chemical examination: and found among the minerals which occur in veins beautiful foliated crystals, which I ascertained by chemical examination to be Margarite or the Emerylite of J. Lawrence Smith, a constant associate with the Emery of Naxos, Ephesus and other localities in Greece, Asia Minor and Siberia. With this also I found two other associates of emery, the Chlorotoid and black Tourmaline, which are more common minerals. The rocks were also found to be similar to those of known emery localities, and from these premises I at once declared my full belief that emery would be found at the Chester locality, and urged that it should be sought for.

Subsequently I saw Dr. Lucas at my office, and explained to him the nature of the emery rock, and showed him how to identify it, and asked him to send to me any mineral he might find, that would readily

* I would here express my obligations to Dr. Lucas for valuable assistance in the field during all my explorations. He has been active in searching the hills, and is one of the owners of the property I am describing.

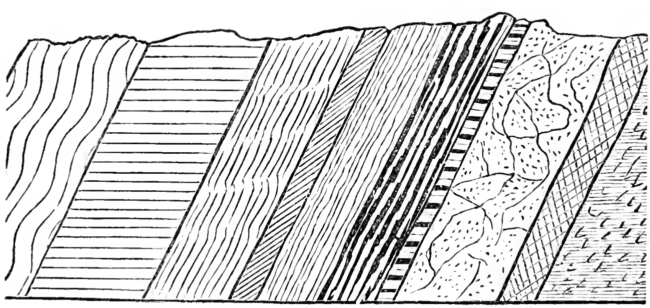
scratch quartz crystals. In a few weeks he sent me some pieces of a mineral which the workmen said "wore out forty drills in boring a single hole for blasting," and on physical, chemical and microscopical examination, it proved to be identical with the emery of Naxos, with which it was compared. It was found to scratch quartz and topaz readily, and I cut a face on a crystal of quartz with its powder spread with water on a plate of iron. Chemical analysis showed it to consist essentially of Alumina and Protoxide of iron, and its specific gravity was near that of the Naxos emery.

On the 11th of October last, in company with Mr. Taft and several of his associates, I re-visited Chester with a view to a full examination of the localities for emery, and was surprised to find that one of the beds we had all supposed to be magnetic iron ore, and from which hundreds of tons had been taken and smelted with the ores of iron in Berkshire county, was really composed chiefly of pure emery, only a part of the bed being properly an iron ore. Had not the occurrence of Margarite and Chlorotoid called my attention to the probable existence of emery at this locality, it would have been overlooked to this day, and no one knows for how long.

I mention this, as an example of the real uses of supposed useless minerals. They are, to an experienced mineralogist, the guides which point to other and often valuable discoveries. There are many instances in which, by following such indications, valuable ores, before unknown in a district, have been discovered, and they have also been the means of discovering other minerals interesting to science. I would here express my obligations to J. L. Smith of Louisville, Ky., for his valuable contributions to our knowledge of the associated emery minerals of the Grecian Archipelago and Asia Minor, published in the tenth and eleventh volumes of the American Journal of Science, in 1850 and 1851, and for a series of those minerals which he sent me, at that time; since that information aided in the prediction which I made respecting the occurrence of emery in Chester.

The principal bed of emery, in the South Mountain in Chester, is from four to ten feet in width, and is now quarried at the base of the hill. Its course is nearly N. 20° E., S. 20° W., and its angle of dip is 70° eastward. The bed widens rapidly as it rises in the mountain, and is in one place, where it is associated with a bed of iron ore, seventeen feet wide, the emery itself being not less than ten feet in the clear. The highest point where it outcrops is seven hundred and fifty feet above the immediate base of the mountain; the bed cuts through both the South and the North Mountains, and has been traced, in length, four miles. The depth to which it penetrates below the lowest point seen must be very great, so that we may say without exaggeration that it is inexhaustible. I noticed some very curious facts relating to the segregation of the emery. Frequently large globular masses of it are found of uncommon purity separated from the principal masses of the bed and surrounded by a thin layer of bright green Chlorotoid, and a thicker layer of interwoven laminated crystals of delicate lilac colored Margarite, sometimes two or more inches in thickness. These minerals, according to Dr. J. Lawrence Smith's theory of the segregation of emery, are minerals of elimination, or were thrown off by the segregating emery. Some of these balls of emery are three feet or more in diameter, and are extremely difficult to break, for the sledge can get no gripe on the rounded surfaces, and it is almost impossible to drill them. I therefore advised the application of fire, which by irregularly expanding the masses will cause them to break to pieces; or, that they be cracked by means of a heavy drop hammer, if it is desirable not to roast the emery. Experiment shows, however, that the grain of the mineral is not injured for practical use by any degree of heat applied to it.

The following diagram represents a section of the rocks at the base of the South Mountain.



9. 8. 7. 6. 5. 4. 3. 2. 1.

Beginning at the right or lower rocks we have

1. Highly crystalline and brilliant black Hornblende Rock which extends to the eastward for some distance, but how far is not known.
2. A bed of magnetic iron ore more or less impregnated with emery.
3. The emery bed with numerous strings and reticulated veins of Margarite, Chlorotoid and black Tourmaline. This bed is here four feet thick.
4. A small bed of granular Quartzite.
5. Chlorite and Talcose slate mixed.
6. Crystallized Talc.
7. Talcose Slate rock.
8. Soap Stone or Talcose rock.

9. Mica Slate rock extending to the eastward to a distance unknown, but very far.

NORTH MOUNTAIN.

On the North Mountain, which is separated from the South Mountain by a branch of Westfield River, we find three large beds of rich magnetic iron ore, six feet wide, included in Chlorite slate rocks; and a bed of more largely crystalline emery, some of it approaching corundum in its structure and purity, and having a red brown color, instead of the usual bluish tint of emery.

This bed is seen in raised ridges where ancient glacial or drift action has worn away the softer materials of the rock, and left it exposed; and, strange as it may appear, this — one of the hardest minerals known — has been smoothed and polished by the agency of drift grinding.

I present to the Society a surface specimen thus polished by drift action.

The principal bed of emery on this mountain is seven feet in thickness, and the emery is more free from oxide of iron than it is on the South Mountain, but still it is quite strongly magnetic, and contains protoxide of iron and oxide of titanium.

A section of this mountain is as follows, beginning at the right or lower rocks, and proceeding upwards.

1. Hornblende rock.
2. Magnetic iron ore.
3. Emery, seven feet.
4. Hornblende rock.
5. Chlorite slate.
6. Magnetic iron ore, six feet.
7. Talcose slate.
8. Magnetic iron ore, six feet.
9. Mica slate.

It is probable that all three of these beds of iron ore will be found on the South Mountain; for they run directly towards it, and it is not far distant. The soil, at present, prevents their being seen if they are there, and I doubt not they will be found by proper search by costeaning, or digging down to the rocks across the line of the beds as indicated by those of the North Mountain.

It is evident, however, that in the discovered beds we have iron ore enough to use for a century to come, but it will be convenient to mine the ore on the side of the South Mountain also.

Specific gravities of specimens of the emery.

Two specimens from South Mountain .	4.02 and 4.37
Two specimens from North Mountain .	3.75 " 3.80
Two specimens from Naxos, Greece . .	3.71 " 3.72

The hardness of the emery, since it scratches topaz, is of course 9 of Mohs' scale.

Chemical analysis of the emery of the North Mountain.

Alumina	46.50
Protoxide of iron	44.00
Titanic acid	5.00
Silica and moisture	4.50
	100.00

Specimens from the South Mountain.

Alumina	45.50
Protoxide of iron	43.00
Silica, Titanic acid and water	11.50
	100.00

The mineral was rendered soluble by successive fusions with bi-sulphate of potash, and lastly by fusion with a mixture of carbonate of soda and hydrate of potassa. In other respects the analyses were made in the usual way.

After digesting the finely crushed and levigated emery with a mixture of nitric and chlorhydric acids, so as to remove all the oxide of iron that was free and soluble, we have for the composition of three samples of emery.

	1. Chester.	2. Chester.	3. Naxos best selected.
Alumina	60.40	59.05	62.30
Protoxide Iron	39.60	40.95	37.70
	100.00	100.00	100.00

From which it would appear that protoxide of iron is an essential chemical ingredient in emery, and not an accidental admixture. Dr. J. Lawrence Smith's experiments lead to the same result, but he considers the oxide of iron to be an irregular mixture with the alumina, and not a regular chemical constituent. In either case I think emery ought to rank as a separate species and not as a granular variety of corundum, from which it so differs in physical characters.

Margarite of Naxos, according to Dr. J. L. Smith, with the specific gravity 2.80 to 3.09, consists of

Silica	30.02
Alumina	49.52
Lime	10.82
Oxide of iron	1.65
Magnesia	0.48
Potash and soda	1.25
Water	5.55
	99.29

$$\text{Formula } \dot{\mathrm{R}}^2\, \dddot{\mathrm{Si}} + 2\, \dddot{\mathrm{Al}}^2\, \dddot{\mathrm{Si}} + 2\, \dot{\mathrm{H}}.$$

Chlorotoid of Naxos, according to Dr. Smith, with the specific gravity 3.52 H. 6, consists of

Silica	23.20
Alumina	40.21
Protoxide iron	27.25
Water	6.97
Lime	0.83
Magnesia	0.95
	99.41

Practical trials of the Chester emery, by skilled workmen, have proved that it is fully equal to the best London prepared emery from Naxos, and in one of the fairest trials, it was found to excel that emery in the work it performed in grinding hardened swordblades, in the ratio of twenty to fifteen, and the Chester emery wheel after grinding twenty swords was far from being used up, while never more than fifteen had been ground by the wheels armed with the London emery. This experiment was made by Mr. Ames of Chicopee.

Those familiar with the working of hard metals, or with cutting and polishing of hard stones, need not be informed that this discovery of emery in our country and State is of vast practical importance. I may however remind you, that at the present time when we are manufacturing so many arms of all kinds for the preservation of our country from ruin, and when foreign exchange renders importation doubly expensive, that an emery mine, situated near our great armories, is a matter of national importance. I may also add, that in case of war with any great European power, the mines of Naxos, our only present means of supply, would be effectually closed to us, and then we should feel that a kind Providence had supplied a great want in our defence and for the maintenance of our independence.

It may not be generally known that the emery of the Grecian Archipelago is monopolized by a single banking-house in London, and those of Asia Minor are also monopolized by a single mercantile house in Smyrna, these monopolies having raised the price of emery four-fold. Now Massachusetts overrides this monopoly, and can supply not only this country, but the entire world with the best of emery for all coming time.

One of our citizens, a member of the Society, Mr. John B. Taft of Boston, is, in behalf of his associates, the present manager of this new mining enterprise, and possesses adequate means and authority to render their operations prosperous.

Boston, Dec. 17, 1864.

Dr. B. J. Jeffries announced that on the Friday evening previous, several members of the Society specially interested in microscopical studies, had met in the room of that department to take active measures to organize a Section of Microscopy, and invited all members interested to attend the next meeting on the Wednesday evening following, when it was hoped the organization would be permanently effected.

January 4, 1865.

The President in the chair.

Thirty-two members present.

Mr. W. H. Niles presented "An Enumeration of Fossils collected in the Niagara Limestone at Chicago, Illinois, with descriptions of several new species." By Prof. Alexander Winchell and Prof. Oliver Marcy.

Remarks on the Type of Buteo insignatus Cassin. By Henry Bryant, M. D.

Since writing the paper on *Buteo Harlani?* published in the Proceedings of the Boston Society of Natural History, Volume VIII., page 107, I have had an opportunity of examining at the Smithsonian Institution the original specimen* on which *Buteo insignatus* Cassin was founded.

* This specimen was kindly loaned for this purpose by its present proprietress, Mrs. McCulloch, through the mediation of George Barnston, Esq., of Montreal.

It differs in no respect from the other specimens examined by me, and determined to be identical with *Swainsonii* and *Bairdii*. It is smaller than the average, but in the proportions of the primaries and in color almost identical with No. 13,228. Another specimen in the cabinet of the Institution, No. 22,567, from the head waters of the Anderson River, is still darker and smaller than any specimen previously seen by me, but does not differ in its proportions from the others.

The following is a description of the color of this specimen:

Above dark purplish brown, the base of the feathers whitish on the forehead, showing as a narrow, ill-defined white line next the bill. The borders of all the feathers on the back and scapulars paler without any purplish gloss; upper tail coverts barred with paler; primaries dark brown with a slight purplish gloss, almost black towards the tips of the outer ones, rather hoary on the outer webs and becoming lighter on the inner webs towards the base and faintly barred with lighter; secondaries and tertiaries brownish with numerous irregularly broadly V-shaped marks, the angle towards the base; tail hoary brown, barred with darker, and tipped with lighter, the subterminal bar quite broad, the number of bars seven.

Beneath purplish brown, the margins of the feathers of the throat whitish at the base, showing slightly through the dark; tibiæ purplish brown very distinctly barred with purplish rufous; crissum dirty white, barred with brown and with the tips of the feathers pale rufous; tail hoary with the brown bars very distinct; under surface of wings slaty brown, becoming nearly white towards the base of the quills and barred with lighter except towards their tips.

This bird has as good a claim for specific rank, if color in this genus is considered as a reliable test, as B. insignatus or Bairdii; this however is not my opinion, and the examination of the additional specimens received by the Smithsonian Institution since the publication of the paper referred to only serves to strengthen the theory there advanced that Harlani?, Swainsonii, Bairdii and insignatus are all varieties of one species.

Remarks on Sphyropicus varius Linn. By Henry Bryant, M. D.

It has long been known that some of our smaller woodpeckers pick out portions of the sound bark of trees, particularly of apple trees, where there are no larvæ and apparently no inducement for them to do so. What their object is has never been satisfactorily established. In Massachusetts I am not aware that these holes are ever sufficiently large or numerous to cause any material injury to the apple trees; they are generally seen in circles round the limbs or trunks of small irregularly rounded holes, and in this vicinity are made almost exclusively by the Downy Woodpecker, *P. pubescens*, aided occasionally by the Hairy Woodpecker, *P. villosus.* In certain parts of the West, however, it is said that great damage is done to orchards by the yellow-bellied Woodpecker, *S. varius;* and Dr. Hoy of Racine, Wis., has advanced the theory that the object of the bird in so doing is to obtain the inner bark for food. A number of specimens of this bird forwarded by Dr. Hoy to the Smithsonian Institution have been placed in my hands by Professor Baird for examination; as the specimens are alcoholic the soft parts are, as is always the case, too much distorted to be available for correct comparisons; the gizzard, however, seems smaller and the proventriculus larger than in other species of this family with which I have compared them. The contents of the stomach are berries, small coleoptera, larvæ of boring beetles, ants and fragments of the inner bark of the apple tree. In order that the extremely aberrant forms of the tongue of this bird can be more readily seen I subjoin brief descriptions of the tongue of a tropical Woodpecker, of a Colaptes, and of the bird in question.

Tongue of *P. villosus.* Free portion twenty-seven millimetres in length, of which the horny tip occupies nine. The general shape of the soft part is cylindrical, somewhat flattened towards the tip and covered with numerous transverse wrinkles deepest towards the base; its diameter at the base three and and a half millimetres and next the horny tip one in breadth and three-quarters in thickness. The horny tip is triangular, one and a half millimetres in breadth, and three-quarters in thickness at the base, terminating anteriorly in a sharp point, its upper surface flattened, slightly concave near the base, the under surface slightly convex, the sides smooth on the basal half and with the anterior half armed with five or six strong horny points or spiculæ projecting backward at an angle of about thirty degrees; the largest nearest the base. The cornua of the hyoid bone curve round the base of the skull, gradually converging to the vertex, then leaving the median line together run round the right orbit terminating opposite the centre of its posterior border.

Tongue of *C. auratus.* Free portion thirty-nine millimetres in length, of which the horny tip occupies only two and a half. The general appearance of the soft parts similar to that of P. villosus but somewhat less flattened towards the tip; its diameter at its base three millimetres, diminishing to one and a quarter in breadth and one in thickness next the horny tip, which is one millimetre in breadth and one half in thickness; at the base acutely triangular with the apex broadly truncated, the basal half of the sides smooth and one or two spiculæ on the anterior half similar in direction but not so large as those of P. villosus, cornua of hyoid bone similar in direction to those of P. villosus as far the vertex, then running to the bottom of the anterior part of the nasal groove.

Tongue of *S. varius*. Free portion twenty millimetres in length, of which thirteen are occupied by the horny tip; general shape of soft portion a flattened oval with the ends truncated; there are no appearances of rugæ on its surface; its greatest breadth is four millimetres, and thickness one and a half, the horny portion is triangular, less acutely so than in P. villosus, two and a quarter in breadth and one in thickness at the base, its upper surface slightly concave and the under surface convex. The posterior half of sides smooth, the anterior half with numerous soft horny fragments, those nearest the base projecting backward. Cornua of hyoid bone extending also half way from the occiput to the vertex, and not converging at the tips. The general shape of the whole tongue is not much unlike that of the robin, the ciliated edges show an analogy to the Meliphagidae and indicates that the sap of the trees pecked by them may form a portion of their food. In the stomachs of the six individuals examined by me fragments of the inner bark were found in all, so that it can hardly be presumed to have been accidentally introduced. It is evident from the shape of the tongue that it is not used as a dart, in the manner of the true woodpecker, to draw out insects from their lurking places, but that these are seized by the bill as in other insectivorous birds. Insects, however, probably form their chief diet, as all the stomachs examined also contained insects, the quantity of which was greater than that of the fragments of bark; in one bird there were two larvæ of a boring beetle so large that there was not room for both in the stomach at once and one remained in the lower part of the œsophagus. If these were, as is probable, the larvæ of the Saperda, they would do more damage than twenty woodpeckers, and I sincerely hope that the birds are not to be exterminated unless it is clearly demonstrated that the injury caused by the destruction of the bark is not more than compensated by their destruction of noxious insects.

Dr. C. F. Winslow read an elaborate paper on the general causes which have produced the present irregularities of the earth's surface; he believed these irregularities to be due to sudden depressions and revulsions of the crust, by which the earth becomes reduced in size, the result of a repulsive cosmical force.

Rev. E. B. Eddy presented two specimens of Anastase, a mineral never before discovered in this country. It occurs at the Dexter Lime Rock, Smithfield, R. I., and is always associated with crystallized quartz, Nacrite, Acicular Natrolite and Pearl Spar. The rock is Dolomite. The needles of Natrolite penetrate the quartz crystals in every direction, and the Calcite also. It was discovered by the donor in September, 1864.

The Secretary read the Resolutions adopted at the last meeting of the Section of Microscopy, by which a permanent organization was effected.

The following gentlemen were elected Resident Members: Mr. Luther Hills of Chelsea, Rev. E. B. Eddy of Waltham, Dr. Thomas B. Hitchcock of Boston, Mr. Alexander Wadsworth, Dr. James D. Whelpley, Mr. Thomas E. Satterthwaite, Rev. E. N. Kirk, Mr. B. F. Campbell, Mr. Charles Whittier, Mr. William Stowe and Mr. E. D. Chamberlin, Jr.

January 18, 1865.

Mr. T. T. Bouvé in the chair.

Twenty-eight members present.

Dr. B. Joy Jeffries explained his views in regard to the Anatomy and Physiology of Accommodation in the human eye.

As the eye naturally can only focus parallel rays, or those nearly so, upon its retina, there must be some change in the shape of the eye itself or in its refractive media to enable it to focus divergent rays, or those coming from objects near to. This act of accommodation was thought to be accomplished by pressure of the external muscles altering the shape of the eye, or forcing forward the crystalline lens. Total paralysis of all the external muscles not affecting accommodation disproves this theory. Some change must therefore take place within the eye itself. Professor Helmholz examined, with an instrument called the Phaciodoscope the three images of a lighted candle, given by the cornea, the anterior, and the posterior surfaces of the lens. This experiment was described by Dr. Jeffries, and the deductions from it explained, namely, that during the act of accommodation the cornea does not change its shape, the lens does not move, but that its shape alters. Its anterior curve becomes greater, pushing forward the edge of the iris forming the pupil, while the outer circle of the iris is pushed back by the aqueous humor. Professor Knapp calculated the effect of this change and found it was quite sufficient to account for all the range of accommodation: i. e., sufficient to enable the eye to focus all the differently diverging rays coming from objects at the distance of six inches to fifteen feet. The question now was how the change was produced. By pressure of the iris on the lens? By pressure of the ciliary processes on the lens? By both these combined? These theories are all shown to be wrong from a case of Professor Græfe's where, by accident, during an operation on the eye, the entire iris was torn away. The power of accommodation remained. Moreover, the ciliary processes being laid bare to view, it was seen that during the act of accommodation they did not touch the lens, which, as it were, of itself took a more convex shape. Dr. Jeffries next described the ciliary muscle first spoken of as such, by Dr. Clay Wallace of New York, afterwards simultaneously studied by Professor Bowman of London and Professor Brücke of Vienna; also by Professor Arlt and Heinrich Müller, who discovered a set of circular fibres close to its attachment to the sclerotic. This is a true muscle, freely supplied with nerves from the lenticular ganglion and the nasal branch of the ophthalmic division of the fifth nerve. In the act of accommodation we have a sensation of muscular effort. Dr. Jeffries thought the change in the lens was produced by the action of this muscle drawing forward the choroid and ciliary processes, and thus slacking up the ligament of the lens by which it is suspended, and so allowing it to take its (as it were) natural, more convex form: i. e., to become thicker antero-posteriorly. This it does when removed from the eye. The ciliary ligament, by its tension, keeps the lens flattened; the action of the muscle slacks up this tension and the lens assumes its more spherical shape. Dr. Jeffries exhibited dissections of the eyes of the seal, horse-mackerel and sword-fish in illustration of the anatomy of the lens, its capsule and ligament, and a model in imitation of one of Professor Ludwig's of Vienna, to show the action of the ciliary muscle and the change of shape of the lens. Dr. Jeffries said, as old age came on the lens grew harder, the muscle less powerful, and we therefore had to supply this deficiency by a convex glass before the eye. He gave some illustrations of the importance of this muscle and a proper appreciation of its action, as through it we gained distinct vision of near objects, and when it failed the causes must be thoroughly understood to enable the oculist to assist his patient. He described the action of atropine and the calabar bean upon this muscle and the iris; these two substances being opposed to each other in their influence upon the ciliary muscle.

Mr. S. H. Scudder exhibited diagrams illustrative of the structure of the wings in the two fossil insects from carboniferous concretions in Illinois, recently described by Professor Dana, in the American Journal of Science,* under the names of Miamia and Hemeristia, together with similar ones, to show the distinctions between the different families of Neuropterous insects, based upon the neuration of the wings alone.

He pointed out, by means of these, how it was possible in the case of Hemeristia, where portions of four completely overlapping wings were all that were left to us, to decide whether the upper or under surface of the wings was presented to our view; whether the right or the left wing overlapped the other, and to which of the four wings each of the numerous nervures and cross-veins belonged, and thus to reconstruct the complete wing as a basis to determine the relation of the insect to other neuropterous types.

He endeavored further to show, by a comparison of the mode of neuration in these two fossil forms with that of the different families of Neuroptera now living, that they each belonged to a distinct family, to which he applied the names of Palæopterina and Hemeristina. By certain characters they were allied to those families which are now generally grouped under the name of Pseudoneuroptera; and, by certain others, to the Neuroptera proper, in reality exhibiting a synthetic neuropterous type, in which are combined characters which hitherto had been known only as belonging to distinct groups. The other parts of the insect, in the only specimen which has much of the body besides the wings remaining, exhibited in a similar manner, characters borrowed from families belonging some to one, some to the other, of these two great groups.

Mr. Scudder also referred to the discovery of fossil insect remains even older than these, and the oldest, he believed, yet discovered any where, obtained from Devonian strata in New Brunswick, by Mr. C. F. Hartt, which exhibited similar synthetic relations, and represented, in some cases, still additional families of Neuroptera.

Dr. Bryant remarked that he had seen an Arkansas Fly-catcher which had been shot in Plympton, Me., in October, which was more remarkable than even the case of the thrush before mentioned, since the fly-catcher was a young bird not over two or three months old.

Drs. C. W. Swan and H. F. Damon, and Messrs. Isaac Y. Chubbuck of Roxbury and J. H. Clapp were elected Resident Members.

* Vol. XXXVII. p. 34. Jan. 1864.

February 1, 1865.

The President in the chair.

Thirty members present.

Dr. B. Joy Jeffries exhibited a diagram in illustration of his remarks at the previous meeting, one half of which presented the appearance of the eye in its natural position, the other half during accommodation.

The President thought that the question was yet open to discussion whether the change of form in the lens did not take place within itself by its own contractibility, without reference to any external force.

Dr. C. T. Jackson presented a large and fine specimen of Calcite, from Martinsburg, N. Y. He remarked that the calcite in that locality was found in two sets of veins very nearly parallel to one another, and only three hundred yards apart, in one of which the crystals were lenticular, and in the other the six-sided prisms were found. He further added that the metalliferous veins of that section were found, as Vanuxem first pointed out, either running in a north-southerly direction, or in an east-westerly direction. Those which ran in a north-southerly direction contained no lead, while the other always contained highly crystallized galena. Dr. Jackson thought this was explained readily on the supposition that the veins were produced at two entirely distinct periods. The galena, he believes, was raised in vapor or sublimed, instancing experiments to show that this must be the case.

The results of some experiments upon the penetration of moulds into the interior of closed cavities, in continuation of former remarks on the same subject, were commented upon by Professor Jeffries Wyman, as having a bearing upon questions now raised of the origin of minute organisms.

Six eggs were placed on a sand-bath and heated sufficiently to coagulate the albumen, and until they had lost one-fourth of their weight. Thus a clear air-space between the inner membranes of the egg was made. They were then placed in a ground-glass stoppered jar with a little water at the bottom to facilitate decomposition; in this they remained two weeks, when one of them was examined. One-fourth of the interior was filled with air, the membranes were unbroken, and there was no crack in the shell, but the whole cavity was lined with a full crop of mould giving out its spores abundantly. The others were examined later, with the same results in all.

There were three ways in which to account for the presence of the mould:—

That the spores were already in the egg when laid.

That they afterward penetrated from without inward.

That they were produced by spontaneous generation.

Prof. Wyman thought that the first supposition, though not probable, was possible. He considered it more likely that they had penetrated through the shell itself, because the shell was made up of granules of lime and the membranes of fibres, and therefore not homogeneous, but more strictly a texture.

In answer to an inquiry of Dr. White, Prof. Wyman stated that he had not seen the spores making their way through either the shell or the membrane.

Dr. C. T. Jackson suggested covering the egg with soluble glass to prevent the possibility of the entrance of spores.

Another experiment was mentioned by Professor Wyman, in which he endeavored to test the assertion of Pasteur that Vibrios and Bacteriums have the power of resisting the action of boiling water.

He took three vessels thoroughly cleansed, in each of which a similar quantity of boiled and filtered beef-juice was placed. One he allowed to remain as it was; to the second he added five drops of infusorial water; and to the third five drops of the same infusorial water after it had been boiled. At the commencement of the experiment the liquid in all the vessels was transparent — at the end of twenty-four hours the first was still transparent, the second had become turbid, from the presence of infusoria which had rapidly multiplied, and the third remained as transparent as the first, nor did it become turbid until the third day, when the first and third were equally so.

The experiment was repeated with thirty vessels in three series of ten, each with exactly similar results. Thus it appears that a given organic solution does not become invaded any sooner when boiled infusoria are added to it than when none are added; while portions of the same solution to which infusoria that have not been boiled are added become invaded in the course of twenty-four hours, the others requiring three days.

The following gentlemen were elected members:

As Honorary Member:—Prof. Joseph Henry of the Smithsonian Institution.

As Corresponding Members: — Prof. Oliver Marcy, of the Northwestern University, Chicago, Prof. Alexander Winchell, of the University of Michigan, Prof. J. D. Whitney, of the California Geol. Survey, and Mr. D. G. Elliott, of New York City.

As Resident Members: — Messrs. B. W. Gilbert, Thomas McHayes, Philip S. Sprague of Quincy, N. Willis Bumstead, Paul M. Gidney and James F. Babcock.

February 15, 1865.

The President in the chair.

Thirty-five members present.

Dr. J. C. White exhibited a series of dissected skulls of man, the apes, and monkeys, explaining the principal points of the discussions which have recently attracted so much attention in England and elsewhere, upon the relations of man to the higher apes, based upon the differences of the brain structure. He pointed out in particular the relation of the cerebrum to the cerebellum, showing that not only in man, but also, contrary to the assertions of Owen, in nearly the whole series of the quadrumana except the lowest, the cerebral hemispheres completely covered and even overlapped the cerebellum; and since the separation of man, by

Owen, as a distinct sub-class, was founded principally upon the assumption that this overlapping of the cerebellum by the cerebrum was peculiar to him, and furthermore upon the distinctive presence of a posterior horn to the lateral ventricle, and of the hippocampus minor, which Huxley had also shown to exist in some of the quadrumana, and by whom it was insisted that these distinctions were valueless.

Professor Jeffries Wyman mentioned some of the peculiar characteristics of the elephant's brain.

Dr. White remarked that the highest capacity of the skull of a gorilla, as given by Owen, was thirty-four and a half cubic inches, and that one in the possession of Dr. Wyman contains thirty-five, while the one in the Society's cabinet now exhibited measured even thirty-seven cubic inches.

Dr. Winslow, referring to the remarkable flatness of the occiput in the Peruvian skull just presented by him, observed that in the Peruvians of the present day, whether Indians, or those of the highest rank, the flatness of the occiput was the result of the mode of tending the children, the custom being quite a universal one of swathing the infant in bandages so tightly that it cannot move, and of always laying it upon its back when at rest whether upon a hard or soft surface.

Dr. White remarked that the custom of swathing the child was practised by the Germans until the infant was a year old; and that there could be no doubt that both the brachycephalic and dolichocephalic forms of ancient Peruvian skulls were much modified by the custom of artificial compression.

At this point Dr. C. T. Jackson, Vice President, took the chair, and the Rev. Mr. Waterston addressed the meeting upon some of the educational instrumentalities which he believed to be within reach of the Society; he afterwards embodied his remarks in the following motion:

"That a Committee of three be appointed to consider the subject of courses of lectures to the Public School Teachers of this vicinity, with full powers to act."

The motion was warmly seconded by Mr. Cummings.

Dr. C. T. Jackson proposed that the subject should be referred to the Council.

Mr. T. T. Bouvé thought that a committee from the

Society at large could best carry out the plan, and after some discussion the resolution was passed.

On motion of Mr. Cummings it was voted that the committee be nominated by the chair.

The chair nominated Rev. Mr. Waterston, Mr. Bouvé and Dr. Gould. Mr. Bouvé desired to withdraw his name, as circumstances would prevent his giving his services as a member of such committee. Dr. White being nominated in his place, the committee as thus formed, Rev. Mr. Waterston, Drs. Gould and White, were elected unanimously.

Mr. T. T. Bouvé announced that at the next meeting the Building Committee would make their report and surrender the Building into the hands of the Society.

Professor A. E. Verrill, of Yale College, was elected a Corponding Member, and Dr. Alexander M. Wood a Resident Member.

The following paper was read before the Microscopic Section, February 7th.

Note on Rhabdonema mirificum. By Charles Stodder.

Professors W. H. Harvey and J. W. Bailey published in the Proceedings of the Academy of Natural Science of Philadelphia, October, 1853, a list and descriptions of new species of Diatomaceæ, collected by the United States Exploring Expedition, under Captain Wilkes. One of the new species they called *Hyalosira punctata*, which they describe thus: "Frustules large, united in long chains, rectangular, subquadrate, transversely and uninterruptedly vittate, granulate in the middle of the frustule, the others furnished with a series of conspicuous puncta." Habitat, Tahiti; with no figure.

Professor William Smith, in the second volume, page thirty-five, of the Synopsis of the British Diatomaceæ, published in 1856, mentions in a gathering from Mauritius, the occurrence of a new form of Rhabdonema, to which he gave the name of R. mirificum, and partially describes it as a "magnificent species with alternate and cribrose septa." He published no figure, as it was not a British species.

In the Journal of Microscopical Science, Vol. vi., p. 92, 1858, Dr. Arnott gives some of the characters of R. mirificum, but no figure.

In the same Journal, for 1859, Vol. vii., p. 180, Mr. Brightwell quotes Arnott, and gives a figure, plate ix, figure 11. Ralfs in Pritchard's Infusoria, fourth edition, 1861, page 805, copies Smith and Arnott, and gives a reduced copy of Brightwell's figure.

Harvey and Bailey's figure of *H. punctata* has been printed, but can hardly be said to be published as yet. One hundred copies only of their report were printed by order of Congress. Two years ago, these were in the custody of the Librarian of Congress, and remained in the original package as received from the printer, and it is probable that they yet remain among the unarranged material of the Congressional Library. Fortunately for Science, Professor Asa Gray had some copies printed at his own expense, one of which I now possess. The figure of Hyalosira punctata at once shows its identity with Rhabdonema mirificum of Smith.

Which of these names should be accepted? It is universally admitted that priority of publication secures the right of the author to the name. But what is publication? Is it merely a description in words, or are figures necessary? Harvey and Bailey's description is fuller and more definite, though they mistook the genus, than Smith's and Arnott's. The two genera are closely allied, but the form in question undoubtedly belongs to Rhabdonema. There can be but little doubt, that Smith knew of Harvey and Bailey's description of Hyalosira punctatum, still less doubt that Arnott and Brightwell knew of it when they wrote in 1858 and 1859; while Ralfs certainly knew it in 1860, when he edited the fourth edition of Pritchard, as he publishes descriptions of both species on opposite pages. All these experts, Ralfs, Brightwell and Arnott, and probably Smith, were familiar with the description of Harvey and Bailey, and not one of them appears to have suspected even the identity of the two. Under these circumstances I think it must be decided that Harvey and Bailey, although the original discoverers, are not entitled to the priority, but that Smith's name, first figured by Brightwell in 1859, must be accepted, and the name given by Harvey and Bailey to this species, one of the most beautiful of the Diatomaceæ, must be cancelled.

March 1, 1865.

Mr. C. K. Dillaway in the chair.

Thirty-seven members present.

Mr. T. T. Bouvé exhibited a Gannet, recently obtained for the Society, in the plumage assumed by the bird in its change from the young to the adult stage.

Dr. Jackson made some remarks on Petroleum, its mode of formation and occurrence, and the geological position of rocks bearing it.

Captain N. E. Atwood addressed the meeting upon some points in the history of the Cod.

No other fish. said he, has so wide a geographical range. He had taken three specimens twenty miles north of Cape Hatteras, and here he believed its southern limits terminated. Northward, however, it extends almost indefinitely, and may be found on all the shoal banks; and the question naturally arises whether it is one and the same species which exists all along this eastern coast. The species found on the western coast of Europe has been called Morrhua vulgaris. and that on our coast. that is, off Massachusetts and New York, has been considered by Storer and others as distinct. and given the name of M. americana. The species which occurs off the shores of the British Provinces is doubtful. Perley has called that found near the shore M. americana, while he considers the off-shore species the M. vulgaris of Europe.

The cod varies much as to size. some times growing to very large dimensions. Yarrell says the largest one he knew of weighed sixty pounds. Pennant gives an account of one which weighed seventy-eight pounds. Captain Atwood had seen one at Provincetown which weighed one hundred and a half pounds. On the banks of Newfoundland their average size is such that it takes thirty-five to forty-five fish to weigh one hundred and twelve pounds, when dried. and the largest never weigh more than thirty or forty pounds; when taken on Banquereau and Sable Island Banks. they are smaller. and four or five more fish would be required for the hundred weight. At George's and Brown's Banks, on the other hand. they are larger. and sometimes of extreme size. and no small ones with them. so that the average number required to make the same weight is only fifteen to eighteen. while again in the common fisheries of the Gulf of St. Lawrence it takes as many as seventy or eighty. and up to the time when the fish were taken by "trawling" very few large ones were caught. Since then very large ones. so large as to only require three or four to the hundred weight. when dried. have been taken from the same places. Captain Atwood was unable to say whether these belonged to two species or were the old and young of one.

From the Straits of Belle Isle to Anticosti, the fish are of a considerably uniform size, never weighing more than twenty or at the most twenty-five pounds. and the average requiring one hundred or one hundred and twelve pounds to the hundred weight. when dried. being thus smaller than anywhere along the whole coast. At Bradore. however. there is a small bank five miles from shore. where larger fish are found than even at the Grand Banks, and the same is true of other shoal banks off shore in the Straits of Belle Isle. These fish never go on to the coast, though when they all go off shore at the end of the season they must intermingle. Here there may be two species.

As a further indication of there being two species Captain Atwood stated that the cod off the coast of New England spawned in November and December, on the ledges, while on the banks of Newfoundland they were found with mature spawn late in May or early in June. Yarrell gives ten spines to the first dorsal as a characteristic of M. vulgaris. In M. americana, according to Storer, there are fourteen or fifteen, while some from the banks of Newfoundland, that Captain Atwood counted, had twelve or thirteen.

The liver of the cod varies also in character in different places. A cargo of cod taken on the Banks of Newfoundland will yield much less oil than the same quantity of fish taken on the coast of Labrador; the livers of the cod at Labrador are very much larger and white, but if an equal bulk of livers from these two localities is taken, those from the banks will yield the most oil. This is owing to the fact that the Labrador livers contain a large quantity of water, while those from the Newfoundland Banks are small, and many of them reddish.

In answer to an inquiry about the color of the cod, Captain Atwood said that they varied in coloration; those from the ledges along the coast were much darker, and their food consisted of crabs and mollusks. Upon the banks, the fish that swim the lowest are of a lighter color, and feed on mollusks, but those that keep at the surface are darker and feed on small fish.

Referring to what he had said at a previous meeting about the "Bull-dog" codfish he remarked that he had since learned that they were also found at the Sable Island Bank, and that the fishermen also frequently found what they called "double-jointed fish;" that is, cod, the vertebræ which were more compact, denser, and shorter than usual, giving the fish much shorter proportions.

Mr. David Pulsifer presented an Eel from the West Indian islands, obtained by Mr. David Ranks, and the thanks of the Society were voted for the donation.

The Custodian announced the following donations to the Museum received since the last meeting: — A collection of various animals from the coast near Paita, Peru, collected and presented by Dr. C. F. Winslow; a collection of 106 plants from the Alps of Europe.

The following gentlemen were elected Resident Members: Dr. S. W. Langmaid, Messrs. William Endicott, Jr., and D. W. Job, of Boston; and Charles A. Tufts, of Dover, N. H.

March 15, 1865.

The President in the chair.

Thirty-five members present.

Prof. Jeffries Wyman exhibited the fossil bones recently collected near Riobamba, South America, by Dr. C. F. Winslow, and presented by him to the Society; giving an enumeration of them with some brief observations on the most interesting forms.

BONES OF A HORSE.

1. A fragment of the left temporal bone, including a part of the squamous portion, about two-thirds of the glenoid fossa, and the posterior glenoid process.

2. A fragment of the right lower jaw, comprising the last two molars with their alveoli and a small portion of the base of the coronoid process.

3. A fragment of the "angle" of the same part and probably from the same individual as the preceding.

4. The third molar tooth from the right upper jaw.

5. The atlas nearly entire.

6. The second phalanx of the fore-foot.

The above remains indicate the existence of a species of horse somewhat smaller than the horses of the present time. This is evident, as is seen in the following tables, from a comparison of the corresponding parts of the extinct and fossil species.

TEETH.

	Fossil.	Recent.
Transverse diameter of 3d upper molar .	0.85	1.10
Longitudinal " " " " " .	0.98	1.05
Length of 5th lower molar . . .	0.94	1.05
" " 6th " "	1.15	1.25

ATLAS.

	Fossil.	Recent.
Greatest diameter from side to side . .	5.45	5.65
" " " before backwards .	3.40	4.19
Transverse diameter across posterior articular surfaces	3.28	3.53
Transverse diameter across anterior articular surfaces	2.13	3.54
Greatest thickness from dorsal to ventral surface . . . . . . ,	2.76	3.16

This bone is broader and more depressed in the fossil than in the recent species. In the fossil the anterior articulating surfaces cover the whole of the fossa for the reception of the occipital condyles, but do not in two recent bones, with which they have been compared.

SECOND PHALANX.

	Fossil.	Recent.
Greatest tranverse diameter	1.73	2.15
Length on median line	1.50	1.68

LAMA.

7. Metacarpal bone of gigantic size when compared with the same part in the existing species.

	Fossil. Inches.	Recent. Inches.
Length	11.00	6.73
Breadth of upper end	2.18	1.30
" " middle	1.40	0.71
" " lower end	2.47	1.56

8. Second phalanx; length 3.45 inches in the fossil, 2.20 inches in the recent species.

The height of the existing lama at the shoulders is about three feet. If the proportions of the fossil were the same as in the recent species, then the height of the former at the shoulders as deduced from the size of the metacarpal bone was about five feet.

9. A fragment of the upper end of the femur of a Tapir. The head and neck of the bone are gone.

10. Two molar teeth of the upper jaw of a Deer, of about the size of those of the *Cervus virginianus*.

11. Last molar from the lower jaw of a Deer much larger than the preceding.

12. The left Humerus of a Deer, the lower end of which is broken off. This belonged to an animal somewhat smaller than the Moose.

13. A fragment of the pelvis comprising portions of the left acetabulum, of the ramus of the pubes and of the ascending part of the ilium. It resembles the corresponding part from the horse, though the indentation for the attachment of the rectus muscle is deeper. Uncertain as to its specific character.

14. A fragment of the pelvis comprising the same parts as the preceding, but as large as those of the common horse. 15. Upper end of the tibia of a large Ruminant. 16. Another fragment of the same as the preceding. 17. Astragalus of a Ruminant. 18. Lower end of the tibia of a Ruminant. 19. Caudal vertebræ of a Megatheroid animal. 20. Os calcis; 21. Fragment of the ilium; 22. Occipital crest; 23. Undetermined bones; and 24. Lumbar vertebræ; not determined.

25. Fragments of lumbar vertebræ; 26. Carpal bone of unknown animal; 27. A portion of the lower jaw, the teeth worn to the base of the crowns, so that but little besides the fangs remains; not determined. 28. A fragment of a scapula of unknown animal, including the glenoid cavity. 29. Lower end of the thigh-bone of a mastodon, of about the size of *Mastodon giganteus*. This probably belonged to the Mastodon Humboldtii. 30. Lower end of the radius of a mastodon. 31. Fragment of the ilium of a mastodon.

Mr. Andrew F. Hall donated a specimen of *Lycopodium lepidophyllum* from Sonora, Mexico, which remained curled up when dried, but retained its life indefinitely, expanding when placed in water. He also presented a bulb of the family Amaryllidaceæ, from California, the integuments of which were cottony.

Dr. J. C. White exhibited a human cranium, presented by Mr. Curtis, for which the thanks of the Society were voted.

Professor P. A. Chadbourne, of Williams College, was elected a Corresponding Member; and the following gentlemen Resident Members: Dr. N. S. Cressy, of Cambridge, and Dr. Calvin Pratt, of Boston.

The following paper was read before the Microscopic Section, March 8th:

On a new species of Nitzschia. By R. C. Greenleaf.

Nitzschia mitchelliana. *nov. sp.*

Valve linear lanceolate, arcuate on the dorsal margin, apices curved into a beak-like form, striæ very faint. From the dorsal margin proceed costæ of unequal length, the largest reaching almost to the middle of the valve. Length of longest valve, .0055.

I have examined several specimens of this species, all having the same peculiarities, but have failed of finding a front view. It belongs to the group of N. amphioxys and N. vivax.

I have named this diatom in compliment to my friend, Henry Mitchell, Esq., of the United States Coast Survey, to whom I am indebted for the specimens dredged in St. George River, Maine, and for many other gatherings from our coast and inland waters.

April 5, 1865.

The President in the chair.

Forty-one members present.

The President announced the decease, since the last meeting, of our liberal benefactor, Dr. William J. Walker, at Newport, R. I., April 2, 1865.

He made a few remarks upon the interest which Dr. Walker had taken in our welfare, and offered the following Resolution:

Resolved, That the Boston Society of Natural History recognize in the death of Dr. William Johnson Walker, the loss of their greatest benefactor, and in view of his munificent gifts to this Society, and aid to the cause of education and science, we would ever hold his name in honorable and grateful remembrance.

On motion of Dr. Gould it was voted that a copy be sent to the daily papers of this city.

Dr. Gould moved that in view of the absorbing interest of the hour in national affairs, the Society do adjourn, and hold an informal gathering for the expression of sentiment.

Action upon this motion was postponed until after the business of the evening had been taken up.

The President read a note from Mrs. B. D. Greene, offering to the acceptance of the Boston Society of Natural History, a portrait of Mr. Greene, as a memento of his interest in the study of Natural History, and in the Society instituted in Boston for its advancement.

On motion of Dr. Gould it was voted that the Corresponding Secretary be requested to make an appropriate acknowledgment to Mrs. Greene for her valuable gift.

Dr. W. B. Mackie and Barker B. Kent, Jr., were elected Resident Members.

May 3, 1865.

ANNUAL MEETING.

The President in the chair.

Forty-two members present.

The Secretary read the record of the last Annual and the last regular meetings.

The Custodian made the following Report, embodying the Annual Reports of the Librarian and Curators of the several departments, for 1864–5.

The official year now brought to its close, has been an extremely interesting one in the history of our Society; and a review of what has transpired and is now occupying the attention of the community in connection with this Institution will doubtless show, in after years, that it has been the transitional epoch of its history, the link which unites the old and the new.

Early in the year, on the second of June, 1864, the Society met in the spacious Hall above, to attend the exercises of the dedication of our new Museum, and to listen to an address by Prof. W. B. Rogers, in which the steps were pointed out by which the Society had progressed from the first small gathering of a few ardent lovers of Nature, up through the various phases of its career, and our warm thanks were expressed to the many patrons through whose generosity the Society was then able to display its treasures of Nature in an edifice far surpassing in magnificence any devoted to kindred objects of which this country can boast.*

In but a few months afterwards the efforts of the Society, in endeavoring to raise a working fund, were crowned with complete success. In August last, the subscription books were closed, which brought the Society into possession of $20,000, received from its many patrons,† in addition

* For a list of subscribers to the "Building Fund," see page 142.
† For a list of subscribers to the "Working Fund," see page 143.

to the equal sum given by our late most generous benefactor, Dr. William J. Walker; by which Fund the care of the collections of the Society was at once securely established for all time. Other direct results flowed from the donation of Dr. Walker; from one-half of the income of this fund, representing his gift, prize funds are accumulating in accordance with the provisions of his donation, and a committee has been appointed by the Council to carry these provisions into effect; their report will be presented to you at this meeting.* Quite recently we have been called to mourn the death of our distinguished patron, who in his Will has provided largely for this Society, in common with other Institutions of learning, though the exact terms of his bequest have not yet been made public by the executors.

These are the more important outside influences which have been brought to bear upon the history of the Society during the past year; let us now turn to observe its internal workings.

The year has been spent by the officers of the Society† in bringing order, symmetry and harmony into the arrangements of the collections, etc., after the partial confusion into which they were necessarily thrown during the removal of our stores to our new building. The time of the dedication found much accomplished, and this closing year witnesses an orderly state of things throughout the establishment. In attempting to give a clear account of all the operations of the Society in all its branches for the past year, I will first present the statement of the Librarian, following it by whatever else has transpired in other departments beside that of the Museum itself, and close with the reports of the Curators in charge of the different collections.

The Librarian reports that during the past year a great deal of labor has been expended upon the Library and publications; and that the additions have been very considerable, larger, he believes, than have been received in any previous year from the ordinary sources, although only $71.89 have been spent in the direct purchase of books.

* See page 146.

† For a list of these see page 147.

The following table will show the number of these additions by volumes, parts and pamphlets:

	8vo.			4to.			folio.			
	vls	pts	ph	vls	pts	ph	vls	pts	ph	To'l
Books presented by individuals	55	26	105	13		35	67	1	3	305
" purchased	4	30								34
" deposited by the Republican Institut'n	25	2								27
" received in exchange for our publications	152	357	72	88	152	21	3	90	18	953
" received in exchange from the Smithsonian Institution for duplicates from our Library	9	22	9	8	2					50
" received in exchange from the American Academy for duplicates from our Library	28	6	15	22	43	3	1		1	119
Total .										1488

A careful estimate has also been made of the number of books now in the Library—there are 7,262 volumes, 1,596 parts of volumes and 2,333 pamphlets—in all, 11,191.

Owing to a more liberal policy instituted by the Council about two years since in the distribution of our publications to scientific bodies abroad, we now find our Library rapidly increasing in size in the Transactions of Learned Societies, and every new invoice received through the medium of the Smithsonian Institution (to which we are deeply indebted for their importation free of every expense), adds to their number and value. The ratio of increase has been very great, as may be seen on comparison of the reports of the Librarian for the past few years; a year ago the Librarian reported the number of volumes and pamphlets received during the previous year from this source as 237; the record for the past year shows 953, or four times as many. The number of scientific associations and periodicals at home and abroad with which the Society now exchange their publications is 243.*

The Library has been weeded of superfluous duplicates during the past and a portion of the previous year, the accumulations of years; a MS. catalogue of them has been made with prices annexed, and the more important part of them published in the sale catalogue of Messrs. Wm. Wood & Co., our agents in New York; their sale has already amounted

* A list of these will be found on page 148.

to $917.51, and some $200 to $300 worth still remain unsold; this money is still on hand for the purchase of new books, an insignificant portion of it only having been expended; the sum of money thus placed at our disposal being more considerable than has been in our hands for this purpose for some time past, the Librarian suggests that it be used mainly in the purchase of larger works, such as the scientific reports of expeditions sent out by foreign governments, of which the Library lacks a great many; it would however be undoubtedly advantageous to delay any direct action until their cost in our national currency shall not be so great as at present. Besides the Library duplicates which have been sold, others, particularly the publications of Foreign Societies, have been exchanged with the American Academy of Arts and Sciences and the Smithsonian Institution; the total number received from this source, as seen by the table, is 169.

During the year, the work of cataloguing and arranging the Library has progressed steadily; book plates have been placed in every volume to which they had not already been fastened, and to every book in the front room except some of the publications of Societies, has been attached a digest of the new Library regulations, a process requiring considerable time. The books in the back room are now undergoing the same process; every work as soon as received has been entered on the books, catalogued and placed upon the table and shelves, generally with a detention of but a few hours.

There has also been prepared a List, *in extenso*, of the desiderata among the publications of Scientific Institutions, with a view of taking active means to remedy the deficiencies of this part of the Library.

All this work in the Library would not have been possible without assistance, the expense of which has been defrayed partly by the Society's funds, partly by subscription among the members of the Council, and partly from money given to the Society for this special purpose.

There is now no catalogue of the Library except the Card Catalogue, which, in its present condition, the cards being kept loosely in a partitioned box, is not suitable for examination by the public, because the cards will be misplaced, as, under similar circumstances, they always have been, requiring much time and vexation in their reärrangement—neither are they convenient for use by any one, having outgrown the limits of their former sufficient receptacle; what is now needed is a set of separate trays, with elevated sides and back and open front, in each of which the cards belonging to a few letters can be placed, with rods passing through punched holes in the cards, so as to prevent their removal, but permit their readiest examination by all; this method has been found to succeed admirably in other places, and would seem to be peculiarly suited to our wants; it would become a permanent arrangement, because leaving nothing to be desired in convenience, the only change required by the extension of the Library would be the addition of similar trays.

Much work still remains to be done in order to place the Library in the condition of ready reference and safety which its value demands. Very many of the pamphlets yet remain to be catalogued and placed upon the shelves before they can be of any use to the members; at present they are piled up in heaps awaiting their turn. The whole Library is also in a somewhat unsafe condition so long as we have no separate catalogues wherein the books are arranged according to shelves, or what are generally called alcove catalogues; at present the only means of knowing whether a book has been lost is to look for it on the card catalogue after the attention has been specially called to it; on that account I am unable to report whether or not any books have been lost the past year; a day or two with the alcove catalogue will suffice to tell whether any and what books are missing or misplaced in the whole Library, a work which, without such aid, would certainly require the constant toil of one person for more than a month.

Few persons are aware of the time necessarily consumed in preparing a book for the shelves; take, for instance, a volume of Transactions of some Foreign Academy—it is received through the Smithsonian Institution accompanied by a written blank from them to be signed: it has first to be compared with the record on the blank to see if it be correct; next, for the same purpose, with the letter from the Academy that sends it, and an acknowledgment in full made to the Academy for it, and a record of the acknowledgment taken; then entered on the Record of Publications received in exchange, with all the necessary dates and memoranda; next on the Library Accession Catalogue and indexed for ready reference; after this the title page in full written upon a card with all the necessary cross-references upon other cards; stamped with the Society's name, the book-plate affixed and its blanks filled out, the Library Regulations fastened upon the cover and its place in the Library marked in one corner, it is at last ready for the shelves or tables of the Library; all these points are absolutely essential; the time now occupied in taking care of the books which are presented to the Library consumes an average of over two, and perhaps three, hours a day. When we call to mind the yearly increasing influx of books to the Library, it must be apparent to all that where the Librarian holds other offices requiring much time in their fulfilment, a regular assistant becomes indispensable, especially when so much remains to be done to put the Library already in our hands in proper order.

Other expenditures may be referred to, which it is highly desirable should be made upon the Library. There is a multitude of unbound parts of volumes which are ready for the binder's hands, and the number of loose pamphlets is rapidly increasing, and now numbers over 2,000. These ought to be bound separately in a cheap way, on the plan used in the other Boston Libraries, so that persons wishing to take away a pamphlet need not be compelled to transport a thick volume; the new plan is scarcely more expensive than the old.

The dust which is blown in at the sides of our loose windows, and will continue to be blown in, especially while so much of the ground about us is unoccupied as at present, is injuring the books to an unfortunate degree. Weather-strips it is believed would remedy the trouble in great measure, and perhaps also pay for themselves, in the end, by the saving of fuel.

A book has been furnished, divided off into various subjects, wherein members are invited to record the title, place of publication and price of any book which they desire to have purchased for the Society.

The Librarian is pleased to be able to state that the By-Laws for the regulation of the Library, concerning which there was considerable discussion and doubt when first adopted, just a year since, have proved successful beyond the hopes of the most sanguine. No difficulty whatever has been experienced in the prompt return of books lent, and it has been necessary to impose a fine in but a single instance, when it was promptly paid. He would propose, however, that, as soon as possible, means should be taken to have the Library opened for one or two hours in the evening, for the accommodation of many who find it impossible to come during the day; expressions of such a desire have been frequently made to the Librarian. The number of persons who have taken books from the Library the year past, has been 74, and the number of books taken out, 426.

There have been 18 regular meetings of the Society held during the year, beside two special meetings. In addition to this, the Section of Microscopy has been revived and reorganized under favorable auspices, and seven meetings of this Section have been held ; there has been an average attendance of 34 members at the regular meetings of the Society, and of nine at those of the Section of Microscopy.

At these meetings 23 communications have been presented, as follows:

May 18, 1864.

Prof. J. Wyman. On the development of moulds in the interior of eggs.

June 15, 1864.

S. H. Scudder. Remarks on the physical geography of the Isle of Pines.

Dr Wm. Stimpson. Malakozoölogical Notices. No. 2.

W. H. Niles. Remarks on the relations between the vegetation and geological structure of the hills of Western Massachusetts.

September 21, 1864.

C. A. Shurtleff. The general Plan of Venation in the order of Insects and its modifications in the different suborders.

October 19, 1864.

Capt. N. E. Atwood. Remarks on the habits of the Mackerel and Menhaden, (*Scomber vernalis* and *Alosa menhaden*).

November 2, 1864.

Dr. James C. White. Description of two human skulls recently brought from Stockton, California, and presented to the Society by Dr. C. F. Winslow.

Dr. C. T. Jackson. Remarks on the manufacture of Peat.

November 16, 1864.

Dr. C. F. Winslow. On fossil bones from the Andes.

Dr. A. A. Gould. Remarks on the diverse signification of descriptive terms among Conchologists.

December 7, 1864.

Prof. C. E. Hamlin. Remarks on some facts connected with the development of Frogs, observed at Waterville, Maine. On a Habit of *Certhia americana*, supposed to have been hitherto unnoticed by authors.

Capt. N. E. Atwood. Remarks on the habits of the Dog-Fish, (*Mustelus canis*).

December 21, 1864.

Dr. C. T. Jackson. Discovery of Emery in Chester, Mass.

January 4, 1865.

Profs. Alexander Winchell and Oliver Marcy. Enumeration of Fossils collected in the Niagara Limestone at Chicago, Illinois, with descriptions of several new species.

Dr. Henry Bryant. Remarks on the typical specimen of *Buteo insignatus* Cassin, in confirmation of previously expressed views of the author of the identity of several so-called species of Buteo. An examination of the tongue of *Sphyrapicus varius* in relation to its alleged habit of eating the inner bark of the apple tree.

January 18, 1865.

Dr. B. Joy Jeffries. Anatomy and Physiology of accommodation in the human eye.

S. H. SCUDDER. An inquiry into the zoölogical relations of the first discovered traces of fossil Neuropterous Insects in North America, with remarks on the difference of structure in the wings of living Neuroptera.

February 8, 1865.

CHARLES STODDER. Note on *Rhabdonema mirificum.*

March 1, 1865.

Capt. N. E. ATWOOD. Remarks on some points in the history of the Cod-fish, (*Morrhua americana*).

March 8, 1865.

R. C. GREENLEAF. Description of *Nitzschia Mitchelliana.*

March 15, 1865.

Prof. J. WYMAN. Enumeration of the fossil bones from Riobamba, South America, presented by Dr. C. F. Winslow.

During the past year, the Society has elected one Honorary Member, eight Corresponding Members and 76 Resident Members. Of these latter, 21 have not yet ratified their election by the payment of the admission fee, and six others, who have paid, have not fully complied with the regulations for membership by signing the Constitution.

As the Society has not published anything during the past year, of course little has been done in the distribution of our publications abroad. We sent, however, early in the year, the last number of our Journal and nine sheets of our Proceedings to 212 different Societies and Periodicals, which, in addition to a few special gifts, makes the whole number given in exchange to be equivalent to 55 volumes of our Journal and 121 of our Proceedings.

Besides this, 171 parts of the Journal, equivalent to about 43 volumes, and 18 volumes of the Proceedings have been sold, and $180.80 realized from that source.

The Council has, however, recently authorized the Publishing Committee to print the remainder of the ninth volume of the Proceedings; this is now printed, and will be issued in a few days. They were also directed to reprint a single signature of Vol. II. of the Proceedings, the edition of which had been exhausted, which has been done, and copies of Vol. II. may now be obtained.

During the suspension of publication it was decided that the Proceedings could not be furnished any longer free of cost to the members, without serious detriment to the Treasury; and it has been further deemed advisable to change the form of the Journal from 8vo to 4to, and the title at the same time to "Memoirs," and accordingly the Committee were authorized in December last to issue a circular inviting subscriptions to both these Publications, to see if a sufficient number could be obtained to nearly cover the cost of their publication; careful estimates seemed to prove that 200 subscriptions would cover the expense of printing the Memoirs and 300 that of the Proceedings; up to this time 161 names, representing 172 subscriptions, have been appended to the List, viz., 142 subscriptions to the Memoirs and 164 to the Proceedings. It is confidently hoped that 20 or 30 more names will be added within a month, and that other additions will be made so soon as the issue actually commences. Under these circumstances it seems desirable to recommence the regular issue of our publications without delay; it is the only means whereby we obtain the publications of other Societies, an important part of our Library, and a long suspension may bring serious detriment, especially as it is so recently that we have enlarged our list of correspondents.

Some of the back parts of the Journal and Proceedings are entirely out of print, and others nearly so, in consequence of which, a tariff of prices for the different volumes and parts has been established by the Publishing Committee.

All the copies of the back volumes of the Journal and Proceedings have been carefully examined this year and the latter part of last year; in the early part of this work the Librarian had the welcome assistance of Mr. Horace Mann and Mr. S. M. Buck. These volumes were removed to this building in a great state of confusion; in very many cases the signatures of the Journal had never been assorted, and it was impossible to know how many copies were in the Society's possession until this was done. The copies of the Journal which were perfect in text and plates were placed by themselves and a list made of them, showing that there are 2,800 parts, besides 48 bound volumes; those of which we had copies nearly complete were next assorted, tied up in bundles and marked, and a list of them taken which shows that we have 731 copies of different parts with the text only, and 874 others with some plates but wanting others, besides some sheets still remaining unfolded as they came from the press. The oversheets still remained with many impressions of plates, from which were culled such separate articles as could be obtained, and the plates added where present; 762 copies of 88 different papers were thus obtained, of which a catalogue has been prepared with prices to each annexed. The oversheets and plates still remaining have been assorted, bundled up and labelled, and a list of each prepared and placed on file; there are 1,716 of the former and 1,830 of the latter, of which 68 are colored.

The copperplates themselves were then examined, and those which were not present searched for in every plate-printing establishment in the city, though but a few of the missing ones were found. A list of all the plates which have been published by the Society has been prepared for the Publishing Committee, with a special list of the missing ones. By this it can be seen at once at what cost we may be able to reprint back publications when out of print.

The same care has been bestowed upon the Proceedings, and a complete list of the perfect volumes and oversheets drawn up, by which it appears that we have in our possession, 1,175 unbound and 45 bound volumes, and 15,755 oversheets.

An orderly arrangement has also been introduced, in every other direction. A regular account is now kept with every Society with which we correspond, so that on opposite pages the contents of every parcel received or sent are recorded, and the date of their acknowledgment marked. The transmission of our publications, scattered irregularly through several volumes, has also been indexed from the beginning, for more ready reference.

The Recording Secretary has also undertaken to make an authentic alphabetical list of the Members of the Society, of all classes, from its foundation, in correcting which he has been assisted by Dr. A. A. Gould and T. T. Bouvé, Esq. This list furnishes, so far as possible, the name, residence, time of election and admission of members, the character of their membership, the time and cause of its dissolution, and the offices, if any, held by them. The Records, both of the Society and Council, from the commencement to the present time, have been carefully gleaned for all important data, and the list is believed to be as nearly perfect as practicable, Accompanying it is a list of all the officers since the foundation of the Society, and the times of their entrance upon and exit from office.

In accordance with the provisions of the By-Laws of the Society, the Custodian has opened a Donation Book, in which all objects received for the Museum are entered carefully and numbered by lots. The increase to the Collections during the past year has been very considerable, although only $68.50 has been spent in the purchase of specimens; there are no means of direct comparison with the accessions of former years. The donations number 443 lots and 21,155 specimens, about half of which are Insects, principally forming the cabinet of the late Mr. C. A. Shurtleff, which was bequeathed to us, together with his other collections and accompanying papers; they form the most valuable addition of the year.

The opening of our collections once more to the public, after their long storage, has made our halls again the favorite resort of many; the number of visitors has varied but little, notwithstanding the difficulty of access to the building in the severe winter weather, the unheated apartments at that time, and the breaking up of the ground around us in the spring. No regular record was kept of the number of visitors in the early part of the official year, but since the first of January they have been 7,363 in number, averaging 272 on public days.

We will turn now to the Reports of the Curators. These I have concluded to present, not in any scientific arrangement, but in the order which one would naturally take in passing through the building, endeavoring in the account of each department to give not simply the additions that have been made to it and the work that has been bestowed upon it during the year, but also some general statement of what the collection is as a whole, since no connected account which should combine all the departments, has ever been attempted of recent years. Owing to the absence of some of the Curators, the statements with regard to their collections must be very meagre, but such as they are, they are offered for your consideration.

The principal collection upon the lower floor is that of Botany. The Curator reports it to be in admirable preservation; the plants are arranged in Manilla paper covers and are classified according to Endlicher's Genera Plantarum, the object of this classification being that any one can readily turn to any cover, by ascertaining the number of the desired genus in Endlicher's work, as the covers of the plants bear numbers in accordance and are ranged in numerical sequence around the room. The collection of plants is large, and represents to a great extent the Flora of North America, besides being rich in European forms. The great bulk of the Herbarium was the result of Dr. Benjamin D. Greene's botanical correspondence with the first botanists of Europe for twenty-five years, as well as a constant interchange of specimens with American collectors. Some of his collections were very valuable, such as a suite of the plants collected in Franklin's Arctic Expedition. Among the more interesting acquisitions were Lindheimer's and Wright's Texan and New Mexican collections, Vauthier's Brazilian plants, Bertero's Chilian collections, and various local ones, which remain as yet undistributed, as they were received from Dr. Greene, though they have been thoroughly examined and are free from danger of the ravages of insects. During the last few years the Society has come into the possession of very valuable collections of cryptogamous plants. Bailey's Algæ are well known as an extensive suite of the highest importance as authentic forms of the author's own description; the Fungi presented by the Curator himself, the fruit of many years' collections, numbering some thousand species, are valuable as being, many of them, new and authentic species named from these very specimens. A collection of dried fruits and seed-vessels has been commenced, and the cabinet devoted to this purpose already exhibits a goodly display, numbering about 250 specimens.

The means of study offered to the public are naturally restricted when the objects to be examined are dry, crumbling leaves and flowers. Much work remains to be accomplished, and until the loose specimens are securely glued to paper, the Herbarium must necessarily remain locked from general study; only those who are thoroughly familiar with the handling of perishable specimens can be permitted to have access to the Herbarium in its present state. The principal additions during the past year have been a collection of New England plants, about 1,800 in number, the bequest of our late member, Mr. C. A. Shurtleff, and an admirably preserved suite of German plants, numbering over 1,200 specimens, from Col. Joseph Howland. Besides these we have been the recipients of various minor donations from Drs. Kneeland, Otis, Pickering and C. G. Putman, the Rev. Charles Mason, Mrs. Fielding, Miss Kingman, Messrs. L. Babo, N. Bishop, D. J. Browne, A. T. Hall, C. H. Parker, O. Pickering, S. H. Scudder, John R. Willis and N. Willis, and the Essex Institute.

The small room adjoining the Botanical apartment is that devoted to the Section of Microscopy. The Bailey Bequest forms the basis of this collection, of preëminent value. The slides number nearly 1,400, accompanied by manuscript catalogues or other memoranda, in which the position of more than 3,000 individual objects on the slides are noted with reference to Bailey's universal indicator for the Microscope; these are mostly Diatomaceæ, but there are also many animal tissues and recent and fossil vegetable tissues. In addition to these there is a great quantity of original specimens of microscopic material, collected by various scientific and exploring expeditions, and an extensive series of specimens received from European correspondents, including Ehrenberg and other distinguished microscopists. There is also a volume of microscopic memoranda, containing many valuable notes, and not less than 3,000 sketches, highly valuable as an illustrative accompaniment to the microscopical collection, and a large number of scientific letters containing many valuable scientific facts, well worthy of publication. The rough material has been carefully catalogued by the Curator, and numbers 534 lots. The process of re-cataloguing and arranging the mounted specimens to accommodate them to the indicators now in use has been undertaken by some of the members of the section, and is progressing favorably. The only other collection in this department worth mentioning is that purchased of the heirs of Dr. W. I. Burnett, containing his collection of Acari and other mounted objects, numbering in all about 600 slides, many of them with a number of specimens on each; about 400 of them are animal parasites and the remainder miscellaneous objects such as minute animal organisms, hairs of different animals, etc.

In the Vestibule is displayed the principal portion of the Society's collection of fossil foot-prints, brought together mainly by the late Mr. Marsh and purchased after his death. It is of considerable size and contains many slabs of great magnitude, some of them the finest known, which are of special value in exhibiting the measure of the stride of the paradoxical animals whose impress they bear, as well as in giving one an idea of the abundance of life on the ancient shores of the Connecticut; one important addition has been made during the past year in a slab containing the track of the Cheirotherium from Sorton Quarry, near Liverpool, for which we are indebted to George Moore, Esq., of the Liverpool Free Museum and Capt. Anderson of the Cunard Steamship China. Another important and exceedingly interesting donation the last year has witnessed, is the original cast in sandstone of bones of one of the animals which formed these tracks upon the sandstone of the Connecticut River, almost the only important remains of this nature which have yet been discovered, rescued by Prof. W. B. Rogers from the Government edifice at Newport, into which the block of sandstone containing them was about to be placed, and presented by him to us early in the year. With the exception of these slabs, the Geological and Palæontological collection occupies the eastern half of the principal hall of the Society's Museum and the large room leading from the main hall at the south-eastern corner. In the first case upon the northern side, are placed the fossil bones and other specimens of such species of animal life as have existed on the earth since its occupation by man, i.e., during the period known as the "Era of Mind." Here may be seen some of the remains of enormous birds which have but recently become extinct. Also specimens of rock such as is now forming at Florida, of which a considerable part of that peninsula is composed, made up of the comminuted shells and corals of the adjacent waters. Here, too, are specimens of art, such as jars, bottles and other objects, cemented together by coralline and other deposits, from the bottom of the sea in the Margarita channel eleven fathoms deep, where they were submerged forty years or more since, by the destruction of the Spanish man-of-war San Pedro. These are exhibited to show the progress made in the brief period since their deposit, towards uniting them in a solid conglomerate, and also as an example of the rate of growth of the coral polypidom. There are also in the same case skulls and other remains of the elephant and mastodon of this continent, and of various animals, all of which were contemporaneous with man, or existed but a short time previous to his epoch, certainly since the earth has presented generally the same features of land and ocean as at present; the specimens in this case number 198.

Following this, and extending around the end of the hall until reaching the passage way to the south-eastern room, is a series of cases filled with shells and fossil bones or casts of bones of the Pliocene and the Miocene Tertiary periods. In these may be found representatives of a large number of the remains of carnivorous and herbivorous animals, as well as some huge reptiles, all from the deposits of the Sivalik Hills in India. The specimens in these cases number 572. On the the southern side, toward the middle of the hall, is a case filled with the remains of the life of the Eocene period. Here are some bones of the gigantic Zeuglodon, almost an entire series of the vertebræ of one of which is ranged around the space for the stairway on the middle of the northern side of the hall. In the same case are many beautiful fossil shells of the Paris basin, and some fine impressions of Fishes from Monte Bolca. The number of specimens in this case is 590.

Passing into the south-eastern room, and commencing with the series of wall cases at the right entrance, the visitor first finds the remains of the period in the earth's history next preceding the Tertiary; viz., the Cretaceous or chalk period. Here the specimens are all of marine origin, and the prevalence of Echinoderms becomes a prominent feature among them; about 350 specimens fill the cases of this period; a large proportion of these were presented by Mr. James M. Barnard. Next in order, as we proceed toward the earlier developments of life, we come to the Jurassic period; and in the cases devoted to its animal remains are to be found many rare specimens of Echinoderms, of Ammonites and other unique forms, together numbering about 260 specimens, including some in horizontal cases on the same floor. Then succeed the fossil remains of the Triassic period in the next cases, and these include the splendid collection of the animal impressions upon the Red Sandstone of this age belonging to the Society, the first of which have been referred to as adorning the walls of the hall of entrance. Some of the most interesting of these impressions, as well as many good impressions of Fishes from the rocks of the same age, may be seen in the horizontal cases upon the floor. The specimens of this period number about 170. We come next to those of the coal period arranged in the succeeding cases, where may be seen the fossil plants from the shales that accompany the coal, to the number of about 225 specimens. To these succeed the remains of the Sub-carboniferous period, about 100 specimens; then those of the Devonian period, about 230 specimens; and finally we come to those of the earliest, the Silurian ages, which are represented by many forms of corals, shells and Trilobites, numbering over 500 specimens. The whole collection may be said to consist of about 3,200 specimens all arranged and labelled.

During the past year the cast of the Megatherium presented to the Society by the late Joshua Bates, Esq., of London, has been mounted. This was put up in the centre of the eastern part of the main hall by Mr. Sceva, with artistic skill, under the superintendence of Prof. Jeffries Wyman and Dr. J. C. White, and it is believed to present a posture in accordance with the character and habits of the animal.

The additions during the past year have been considerable, amounting in all to 825 specimens. The most important are a series of casts of large animals obtained from Prof. H. A. Ward in exchange, and a collection of fragments of fossil Mammals from the Andes, collected and presented by Dr. C. F. Winslow. The other donors are the Smithsonian Institution, Prof. H. A. Ward, Drs. H. I. Bowditch, S. A. Green, T. B. Hitchcock, C. T. Jackson and S. Kneeland; and Messrs. E. A. Brigham, W. H. Dall, S. Rice, J. T. Rothrock, H. B. Stanwood and S. H. Scudder.

The north-eastern room is devoted to the Mineralogical collection which is arranged according to Dana's system. There are about 1,500 specimens on exhibition. A great deal of labor has been spent upon the collection by the acting curator, Mr. Bouvé. Within the last three months the whole collection has been entirely reärranged, and every specimen, with few exceptions, has been washed and will soon be labelled. 268 specimens were added during the past year by Drs. A. A. Gould, C. T. Jackson and B. S. Shaw, Rev. E. B. Eddy, Messrs. W. H. Dall, W. T. Eustis, S. H. Scudder, E. L. Sturtevant, and a company of gentlemen.

The space allotted to the collection of Comparative Anatomy and Mammalia, comprises the entire lower floor of the western extremity of the main hall, opposite the Palæontological collections, with the adjoining apartments. The cases in the hall are entirely devoted to the reception of mounted mammalian skeletons, in which department it may be considered the most extensive of any in the country; the south-western room is partially occupied by the skeletons of the ruminants which could not be accommodated in the large hall, and the skeletons of the birds and reptiles; the rest of this room contains the collection of mammalian crania; during the past year the Curator has prepared sections of a series of skulls, representing nearly all the families in the various orders of Mammalia, which have been placed in one of the cases and form an instructive illustration of the comparative size and shape of the brain in this class of the animal kingdom. In the north-western apartment the mounted skeletons and parts of skeletons, the odontological cabinet, the skulls of reptiles, the specimens illustrating the comparative osteology of birds and fishes, the dried dissections and the preparations in alcohol consisting of mammals, embryos, etc., are placed. The Curator calls attention to the large collection of skins, which has not yet been placed in the hands of the taxidermist, for want of the requisite amount of money, and is still in the cellar exposed to injury from insects, hoping that an early appropriation may place this interesting department in a proper condition for exhibition.

Three interesting skeletons have been mounted and placed in the cabinet the past year; viz., the Porpoise, White Whale and Dromedary. So far as practicable, colored representations of the animals have been placed in connection with the labels in the cases containing the mammalian skeletons. The most marked deficiencies in the department are the imperfections in the series of mammalian skulls and particularly the small size of the anthropological cabinet.

At the beginning of the present year the collection, apart from the skins of mammals which were not estimated, amounted to 1,040 specimens, as follows:

Mammals — skeletons mounted, 73; skeletons unmounted, 25; parts of skeletons, 107; skulls, 279; teeth, 93.

Birds — skeletons, 25; parts of skeletons, 56; skulls, 87.

Reptiles — skeletons, 13; parts of skeletons, 8; skulls, 12.

Fishes — parts of skeletons, 57; skulls, 21.

Alcoholic specimens, 100: horns, 50: miscellaneous, 25.

The additions during the past year are enumerated by the

Curator as follows: Skins of mammals, 17; bodies of mammals, 3; mammals in spirits, 4; skeletons of vertebrates, 8; parts of vertebrates, 13; skulls of vertebrates, 32; miscellaneous, 7; total, 84.

The donors have been Drs. H. Bryant, W. Channing, W. E. Coale, C. T. Jackson, S. Kneeland, B. S. Shaw and C. F. Winslow; Mrs. James Phillips, Rev. R. C. Waterston, Capts. N. E. Atwood and Philip Howland; Messrs. Wm. Beetle, Brewer, W. H. Dall, W. P. Kuhn, C. L. Parker, H. A. Purdie, J. G. Rich, S. H. Scudder, C. A. Shurtleff, W. M. Thorup, and Todd; the Chicago Academy of Science, and the Lyceum of Natural History, at Williams College.

The Ethnological collection is temporarily displayed in the deep cases of the north-western room, designed to contain eventually the skins of mammals. It was founded only a few years since, upon the gift of the Boston Marine Society, which consisted of wearing apparel, models of canoes, etc., of the Chinooks, and from Russian America; various implements of warfare and household utensils from Central America, the Hawaiian, Kingsmill, Hervey, Feejee, and Navigator Islands, from the Papuan groups, the East Indies, and the Anamo-Siamese countries, a small collection of Egyptian relics, and African krisses of iron procured and forged by the negro tribes. There have been added to this the collection formed in this neighborhood by the late Mr. Thoreau, and bequeathed us by him, consisting of stone implements of war and home of the aboriginal inhabitants of New England. The most interesting accession of the past year has been the series of casts of ancient Mexican masks from the originals in the possession of the American Philosophical Society, presented by the Smithsonian Institution. Other donations have been received from Mrs. James Phillips, Messrs. E. A. Brigham, W. H. Dall, W. L. Parker, Dr. C. F. Winslow, and a company of gentlemen. In presenting his report the Curator of this department offers the following suggestion for the arrangement of a collection of this nature; — a collection of the handiwork of nations should be arranged according to the distance from the historic centre, or Egypt ; beginning at the farthest remove :

1. The aboriginal American tribes and nations.
2. The islanders of the Pacific, Polynesians, Micronesians, Negrillos and Papuans.
3. The Australians.
4. The East Indian tribes.
5. Madagascar, and Equatorial and Austral Africa.
6. The Japanese and neighboring more Northern islands, with the North Eastern border of Asia.
7. The Chinese empire, with Tartary and Northern Asia.
8. The Anamo-Siamese countries.
9. Hindostan.
10. Persia, Northwestern Asia and all Europe.
11. Arabia, Mesopotamia, Syria, North Africa and Egypt.

The wall cases of the first gallery are devoted exclusively to mounted birds, which also occupy a portion of the southern side of the upper gallery. The collection is in very good condition. The Curator complains that owing to the plan of the cases in the gallery, it is impossible to introduce a careful systematic arrangement ; it is much to be hoped that we may soon be able to open one of the side rooms in which this interesting department more properly belongs, to obviate the difficulties which at present are insurmountable. The Curator urges further that immediate measures be taken to tighten the joints of the cases, through the defects of which the birds are too liable to injury from destructive insects, and to keep out the too powerful light to which they are permanently exposed, and by which they will be inevitably ruined. The collection numbers about 2,500 mounted specimens ; as a general one it represents very well the different orders and families of birds and affords a very favorable opportunity, with the aid of our library, to study general ornithology. As a special collection, however, of the birds, first of the State of Massachusetts, secondly of the United States, and lastly of North America, it is extremely deficient ; and it is of the highest importance that this deficiency be remedied as soon as possible. We need particularly specimens of all our common birds in different states of plumage, commencing with the nestlings. The Curator hopes the Society may be able to authorize the necessary expense for doing this the present year. The donations for the past year have not been very numerous; they number 188 specimens received from the Chicago Academy of Science, Prof. W. B. Rogers, Drs. Aten, Bryant and Coolidge, and Messrs. E. A. Brigham, P. A. Gidney, T. Kumlein, S. H. Scudder and J. T. Smith, and by purchase.

The Department of Oölogy is at present limited to a few of the railing cases of the upper gallery, designed for Insects; it numbers about 800 specimens of eggs and nests on exhibition, almost entirely of American species. During the past year there has been an addition of 164 specimens from Drs. Bryant and Packard, Messrs. Hills and Willis, and the Chicago Academy of Science, and by purchase. Most of them, however, were either of very common species or of little scientific value. The Curator considers it worthy of remark that the eggs of any bird, unless the parent bird has been fully identified, are of no scientific value whatever; and farther that there is no department in Natural History wherein absolute and exact care in ascertaining and in permanently recording the origin of each specimen, is so essential to its value; the eggs of very many species are absolutely indistinguishable from those of several others, unless thus determined. Nor is it enough to ascertain their origin alone; to remain of permanent value, this knowledge must be associated with the specimens by some abiding records of paternity. These important and indispensable laws cannot be too strongly urged upon the attention of all who would make collections for themselves or others, for scientific purposes; without constant attention to exact identification, collections are valueless and specimens are of no intrinsic importance.

Owing to the absence of the Curator of Conchology, I am unable to give so full an account of our admirable collections in this direction as is desirable, though I have received from him some notes in regard to them. The Gasteropods alone are exposed to view, temporarily arranged in the railing-cases of the first gallery. This disposition does not allow of the display of the larger and more showy specimens, so that altogether not more than one-third of the collection is on exhibition, the remainder being stored in one of the unopened rooms, which we hope may soon be furnished for their public display; in consequence of the want of any suitable place for the exhibition of the specimens in this department, the collection remains much as it was at the last annual report. The Curator calls attention to the deficiency of the Museum in alcoholic specimens of Mollusca, which would greatly enhance the interest and value of the collection for scientific purposes. Some interesting collections have been received during the past year, especially a collection of determined species containing over 500 specimens from Cape St. Lucas, received from Dr. Bryant, and another smaller collection of Cuban shells from Dr. Gundlach. The additions have amounted to nearly 2,500 specimens, received from Drs. S. A. Bemis, H. I. Bowditch, H. Bryant, J. Gundlach, S. Kneeland, A. S. Packard, and C. F. Winslow; and Messrs. Bishop, Dall, Hubbard, Scudder, Shurtleff and Willis, and by purchase.

The upper gallery is devoted to the remaining departments. That of Herpetology occupies the wall cases at the eastern end. The collection consists of about 500 species, not far from half of which are upon exhibition. This number, though small, represents to a tolerable degree the Reptiles of New England, and contains some rare specimens from this, as well as foreign countries; it is much to be regretted, however, that the department wants some of the most common, even, of our Massachusetts reptiles, a deficiency which ought least of all to occur here, and which it is hoped will speedily be remedied, now that it is known. The Curator has been occupied during the past year, as far as time and opportunity allowed, in continuing the identification and classification of the specimens under his care. As soon as this important work can be accomplished, each specimen will be labelled carefully; at present, the collection is only distinguished by numbers, referring to a numerical catalogue in course of preparation. The collection is, in every way, in a more satisfactory condition than for some time past; but it is a source of regret that so many of the specimens were, in former years, received and deposited without being identified or any distinguishing mark placed with them, not only making the labor incumbent on the present Curator far more arduous, but rendering the collection of far less value than it might have been with more attention to these important points. As soon as it is possible to complete the arrangement of the collection now in possession of the Society, the Curator has assurance of additions, by donation and exchange, to enable him to fill out certain of the deficiencies which exist. Although the space allotted to this department is large enough to accommodate the present collection, the Curator calls our attention to the fact that it cannot long remain so with the ordinary influx of material for display, and urges the fitting up of one of the unoccupied apartments, for his collection, and that of Ichthyology. The additions to this department during the past year have amounted to 140, and have been received from the following gentlemen: Drs. Bryant, Shaw, and Winslow; Messrs. F. Andernach, Bishop, T. T. Bouvé, L. L. Holden, J. Robertson, R. Scott, S. H. Scudder, C. A. Shurtleff, E. F. Snow, H. C. Whitten, and by purchase.

The cases in which the Ichthyological collections are displayed, are those against the northern wall of the upper gallery. At the beginning of the year the collection consisted of nearly 650 species, represented by about 1,800 specimens, all but 200 of which are preserved in alcohol.

The arrangement of the collection is that of a faunal one and in this only the larger faunal districts could be designated, as the collection is not yet large enough to show the more limited faunæ. The specimens thus arranged come under the following Zoölogical Provinces.

1. The Atlantic coast of North America, from Cape Hatteras northward, including Greenland; represented by about 90 species.

2. The Atlantic coast of North America southward to Cape St. Roque in South America, including Bermuda, the Bahamas and the West Indies; represented by about 170 species.

3. The fresh waters of North America, east of the Rocky Mountains; represented by about 115 species.

4. The Pacific coast of North America; represented by 15 species from the coast of California.

5. The Pacific coast of Central America; represented by 4 species from Panama.

6. The Pacific coast of South America; represented by 6 species from the coast of Peru.

7. The fresh waters of Northern South America; represented by about 50 species.

8. The Mediterranean; represented by 5 species.

9. The coast of Europe; represented by 6 species.

10. The fresh waters of Europe; represented by 14 species.

11. The Canary Islands and the Northwest coast of Africa; represented by 10 species.

12. The East coast of Africa; represented by 10 species.

13. The coast of Southern Asia and the East Indies; represented by 20 species.

14. The fresh waters of Southern Asia; represented by 5 species.

15. The Sandwich Islands; represented by about 200 species.

There are about 64 species in the collection whose localities are not known; these will eventually be used with others, to show the classification and comparative structure of fishes.

The dry and stuffed specimens have not yet been identified or catalogued, though they are for the present placed in one of the cases in the gallery. The alcoholic specimens not yet catalogued and exhibited are contained in the following lots:—1st, a collection of about 200 species of Sandwich Islands fishes presented some years since by Dr. C. F. Winslow; 2d, the fresh water fishes of Northern South America; 3d, various small lots from foreign countries; 4th, the collection of 44 species of Cuban Fish purchased the past year by Mr. Scudder, and kindly identified by Prof. Poey; 5th, the collection of several hundred specimens made by the Curator during the past season at the Richardson Lakes, and at Lake Sebago in Maine. These specimens cannot be exhibited, nor those now on exhibition properly arranged, until more alcohol and bottles can be obtained. The work of cataloguing which has progressed rapidly during the past year, is also hindered from the same cause. At the same time the space at the disposal of the Curator is insufficient for the proper distribution of the fishes in a faunal arrangement, and with the rapid growth of the collection similar to what the past year has witnessed, the opening of one of the unfurnished apartments will soon be, if it is not already, essential. The additions during the past year were over 1,200 specimens, some of which were obtained by purchase, while for the remainder we are indebted to Drs. Bryant, Shaw, Shurtleff and Winslow, Messrs. Bishop, Buck, Dall, Nason, David Pulsifer, Putnam, Snow and Whitten, and to the Lyceum of Natural History in Williams College.

A portion of the collection of Radiates has been placed on exhibition during the past year in the wall cases at the western end of the Hall, and in one of the adjoining ones on the southern side. The Echinoderms have been fully catalogued and arranged, with the exception of those preserved in alcohol, for which no new alcohol or bottles have as yet been provided; among those arranged are the specimens forming the large and valuable collection of Echini presented by Mr. Barnard. Part of the corals have been displayed, but owing to unavoidable circumstances their final arrangement has been delayed, though it will soon be completed. The collection at present is most complete in the order of Echini and in corals, but even in these there are many undesirable deficiencies. The collection of star fishes is still incomplete, even in native species, but we have promise of a series of those found in the Bay of Fundy with their natural colors preserved, from the Museum of Yale College, which have already been selected for us in exchange for some sent by us. Of Holothurians we have but a very meagre collection. A collection embracing 153 specimens and about 60 species, chiefly Echinoderms, has been sent to the Museum of Yale College in exchange. A small collection of corals formerly borrowed by the Curator for study at the Museum of Comparative Zoölogy has been returned, fully labelled; most of them were the original types of species described by Prof. Dana. Donations to the number of about 79 specimens have been received from Drs. Kneeland and Winslow, and Messrs. Shurtleff and Willis.

The remaining wall cases of the upper gallery upon the western end of the southern side contain the Crustacea, one the dried preparations and the other the alcoholic specimens. The Curator being absent in the Army is unable to give any report of operations during the past year, though little or nothing has been done. The collection is a small but select one with representatives from all parts of the world, containing a year ago 122 alcoholic specimens and 198 dried preparations. The past year additions have been made of 129 specimens from Dr. Winslow, Capt. Atwood and Messrs. S. Hubbard, S. H. Scudder, C. A. Shurtleff and J. R. Willis.

The Entomological collection has not heretofore been displayed by the Society, having been, up to the present time, arranged in drawers and boxes, totally excluding the light. Now, however, the railing cases of the upper gallery have been devoted to that purpose, and the task of transposition of portions of the collections into the boxes necessary for this method of arrangement has been commenced, and will be vigorously pursued the present year; it is the intention of the Curator to display all of the collection in this manner, except the cabinet of the late Dr. T. W. Harris, which will be kept by itself; this plan will entail a large amount of work simply in the transferrence of the objects, but will undoubtedly be more satisfactory when concluded. The Insects belonging to the Society belong to four different collections, the old collection, the Hentz collection, the Harris Cabinet and that bequeathed during the last year by the late Mr. C. A. Shurtleff. The old collection was principally rich in exotic Lepidoptera (especially the diurnal) and Coleoptera, besides many Orthoptera and Hymenoptera, and was gathered together in the earlier period of the Society's history by the exertions mainly of Drs. Gould and Harris. The catalogues still extant witness to the great value of the collection. The Hentz collection was purchased of Prof. N. M. Hentz for the sum of $550 by friends of the Society, who subscribed in response to a circular issued by Dr. Harris in 1835. It contained a most choice collection of Coleoptera from all parts of the United States, about 1,500 species in all, catalogued and arranged and accompanied by admirable dissections, copious notes and drawings of characteristic details, and was also very rich in American Hymenoptera. Of these two collections scarcely one fiftieth part remains in a condition fit for any purposes of comparison or identification whatsoever, and almost none which are suitable for public exhibition. The damage done to these collections by the ravages of the Anthrenus, the exposure to dust, and the practice of baking, has been excessive. Some 30 or 40 drawers of specimens appear never to have had a cabinet for their reception; certainly none can now be found, nor have I ever seen a trace of one. Such specimens of these collections as will bear public inspection will be arranged in the systematic collections, and those of which only fragmentary remains can be rescued will be placed for a study collection in drawers. The Harris Cabinet was purchased in 1858, shortly before the Curatorship was offered to the present incumbent. It had previously been carefully scrutinized by Mr. Alexander Agassiz, who selected from the maze of boxes in which a considerable portion of the collection had been placed, such as were worthy of preservation after the exposure they had been subjected to, subsequent to Dr. Harris's death and before they had reached our hands. The arranged collection of United States Insects had, however, received no injury from this cause, having remained in the hands of his family. The injury thus mentioned to all these collections has resulted from the same cause, namely, the want of *constant* care of the objects. There are no objects of Natural History so endangered by destructive insects as Entomological collections. An inspection of the Curators' reports in years past leads the Curator to think that a great part of this injury to the old Society collection and to the Hentz collection occurred not far from the time of the dangerous illness and subsequent death of Dr.

Burnett, the then Curator in charge; he being obliged to leave them while in a state of disorder, when just beginning to arrange them. Thousands of specimens of Dr. Harris's insects which had been stored in the garret of Harvard Library were found destroyed when they came under Mr. Agassiz's supervision, who was able to rescue but about one-fourth part of those which had been put away in that place. The same portion of the collection which was rescued from this fate was again attacked by Anthreni while stored in the rooms occupied by the Society in Bulfinch Street shortly before our removal thence, for they were examined carefully just previous to the Curator's absence from the country a year ago, and were found somewhat infested on his return; and though since that time he has been through the whole collection three times with great care and through parts of it more frequently, and has also been assisted by the skill and patience of Messrs. Smith and Sanborn upon the Coleoptera, he fears that they are not yet wholly free from destroyers. This all shows how great the need is of constant watchfulness; it is as true here, as in medical treatment, that an ounce of prevention is worth a pound of cure.

The Harris Collection comprises from 12,000 to 14,000 specimens and about half the number of species, nearly all from North America. The arrangement initiated with regard to them is to select of every North American species in the collection representatives from every locality, of each sex, and exhibiting every variation discoverable. These are arranged according to the systematic distribution used by him in his own cabinet, so as to be illustrative of his own ideas of their affinities and classification. Each species bears a distinctive number, and every specimen of a species is distinguished from the others by bearing in addition a separate letter, so that any specimen in the collection can be specifically referred to; these numbers refer to a catalogue, distinct from the general catalogue of Insects. In this way most of the Coleoptera were arranged previous to our removal to this building, and since then the work has been completed, and the Orthoptera also gone through with. These two groups occupy 32 drawers of large size. The arrangement of the other groups will be continued during the year.

The Shurtleff Bequest consists of between five and six thousand pinned insects from the United States and mostly from Massachusetts, a small collection of Chinese and Japanese species, over 700 dry chrysalids and insect products, and more than 2,000 insects in alcohol, many of them of earlier stages of the insects. These, with the duplicates of the Harris Collection are forming the basis of a New England collection, to which the Curator has given as much time as possible, though not so much as he desired owing to the unusual amount of work laid upon him by his other official duties in the Society during the past year. Now that an orderly arrangement has been perfected in every part, he hopes to give more time to it. He has, however, arranged and displayed all of the Orthoptera and diurnal Lepidoptera of the collection belonging to New England, now contained, in 17 boxes. The Society is much indebted to Messrs. F. G. Sanborn and George D. Smith for the time and care they have bestowed upon the Coleoptera ; these they examined thoroughly, and will completely arrange. They have already, in the course of the past six months, identified, labelled, transferred and arranged for exhibition nearly 1,000 specimens, comprising over 400 species, and occupying 20 of the boxes prepared for the purpose, which, with the other arranged portions of the New England collection, have been displayed in the railing-cases of the second gallery. This is the first thorough arrangement of the Coleoptera attempted for years, and the pains these gentlemen have been at in selecting the specimens from the confused mass of good and bad, and resetting many of those from Mr. Shurtleff's collection which had evidently been the result of his earlier inexperienced collecting, as well as the taste and care displayed in their arrangement, merit the warmest thanks of the Society. When the arrangement of the New England species has been completed, they will follow out a similar plan for the rest of this country, and, if time will permit them, for the rest of the world.

The cases to which the insects are allotted are unfit, in their present condition, for the preservation of insects on exhibition until they are made, so far as possible, air-tight. Strips of rubber must be placed entirely around the case where the lid meets it, and fastenings must be placed at either end to prevent any springing of the lid; the light, too, is so powerful that it would take but a short time to bleach the highly colored specimens, and some darkening curtain or shutter must be contrived to exclude the light, or other means taken to darken sufficiently the light coming from the lantern roof above.

The additions to this collection during the year have been very important on account of the bequest of Mr. Shurtleff. Including this, they number 10,750 specimens of which 42 are Arachnids and 46 Myriapods. Besides Mr. Shurtleff, the donors have been Drs. S. A. Bemis, H. Bryant, B. S. Shaw, and C. F. Winslow; and Messrs. N. Bishop, W. H. Dall, J. Fairbanks, A. L. Miller, W. L. Parker, J. Robertson, S. H. Scudder and C. J. Sprague; some were obtained by purchase.

The Curator is authorized to say for the gentlemen who have so kindly given him their assistance in the arrangement of the Coleoptera that they are ready, so soon as boxes are provided for them, and the cases are made sufficiently secure to insure the safety of insects deposited there, to supply as many as 1,500 species of Coleoptera from the United States which they will arrange and label carefully; these, with the collection of New England Coleoptera now being arranged by them, would occupy nearly one half of the railing cases around the entire upper gallery.

With a few general remarks upon the Museum the Custodian will bring to an end this already too prolonged report.

There is one class of the animal kingdom, that of Worms, which is not at present assigned to any department; there are, to be sure, but few specimens in the collection, but it would be hardly fitting, even were there none, that it should not find a place. It is suggested that they could be most appropriately given to the charge of the Curator of Crustacea.

There are some defects in the arrangements of the building which ought certainly to be remedied; one, of which two of the Curators have spoken, is that of the excessive light on all days, three only of the windows having shades; these are upon the west end of the main hall and are absolutely essential for the protection of the birds; hardly less important is it for the preservation of the collection for any length of time that the windows of the lantern-roof should be shaded upon all days when the Museum is not open, so as to darken the room as much as it is possible; indeed it would be well if the room could be thoroughly darkened, but unless some protection from the glare of light is given to some of the collections, especially those of Ornithology and Entomology, they will be seriously injured. Another thing that is necessary is the providing the railing cases of the gallery with iron-rod-railings, slightly elevated. So long as the cases are at their present height, the glass will be in continual danger of breakage by visitors who carelessly lean upon it. Several panes have already been broken in that way, and they will doubtless continue to be broken, and injure or destroy the specimens beneath, unless this precaution is taken. The fastenings to the larger cases prove to be very defective; the shrinkage of the doors is constantly rendering them useless or troublesome, and a very considerable sum has already been expended in repeated repairs; they cannot accomplish the object for which they were designed, and should be replaced by locks of some more substantial character, as a safeguard to the collections.

One great hindrance to the arrangement of many of the collections is the want of alcohol, which we are now obliged to pay for at ten times the former price and therefore can use but sparingly. It is believed that this difficulty may be obviated by proper petition to Congress, so that, as in England, methyllated spirits may be used free from the excise, which is almost the only cause of the extravagant price; and steps have been taken which it is hoped may secure a favorable result.

This review of the operations of the past year warrants the Custodian in congratulating the Society upon what it has accomplished during that period, and on the present generally satisfactory state of its affairs; still more, however, upon the brilliant prospects which open before it, if their reasonable expectations be realized; for, so large a ratio does the bequest of our distinguished Patron bear to the funds upon the basis of which the Society has prospered the past year, that it evidently must have a prominent and permanent effect upon the workings of our Institution, not simply in the expanding of the appliances now in force, but even, perhaps, in considerable changes in its modes of administration. With this thought uppermost in our minds and inspiring our action, we may be permitted to express our most confident hope and declare our resolute determination that this Society shall hereafter act even a more prominent part than in the past, in the development of the Natural Sciences in America.

Appendix A.

1. SUBSCRIBERS TO THE BUILDING FUND.

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Joshua Stetson.
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Geo. Washington Warren.
J. Mason Warren, M.D.
Robert Waterston.
William F. Weld.
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H. W. Williams, M.D.
J. Huntington Wolcott.
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2. SUBSCRIBERS TO THE WALKER FUND.

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Thomas Wigglesworth.
J. Huntington Wolcott.
Edward Wyman.

Appendix B.

WALKER PRIZES.

The following prizes were founded by the late Dr. William J Walker, for the best memoirs, and in the English language, on sub jects proposed by a committee appointed by the Council of the Society. The first and second are to be awarded annually; the third once in five years, beginning 1870.

First—For the best memoir presented, a prize of sixty dollars may be awarded. If, however, the memoir be one of marked merit, the amount awarded may be increased to one hundred dollars, at the discretion of the committee.

Second — For the next best memoir, a prize not exceeding fifty dollars may be awarded at the discretion of the committee; but neither of the above prizes shall be awarded unless the memoirs presented shall be deemed of adequate merit.

Third — Grand Honorary Prize. The Council of the Society may award the sum of five hundred dollars for such scientific investigation or discovery in natural history as they may think deserving thereof; provided such investigation or discovery shall have first been made known and published in the United States of America; and shall have been, at the time of said award, made known and published at least one year. If in consequence of the extraordinary merit of any such investigation or discovery, the Council of the Society should see fit, they may award therefor the sum of one thousand dollars.

Subject of the Annual Prize for 1865–6. "Adduce and discuss the evidences of the co-existence of man and extinct animals, with the view of determining the limits of his antiquity.

Subject for 1866–7. "The fertilization of plants by the agency of insects, in reference both to cases where this agency is absolutely necessary, and where it is only accessory;" the investigations to be in preference directed to indigenous plants.

Memoirs offered in competition for the above prizes must be forwarded on or before April first, prepaid and addressed

"*Boston Society of Natural History,*
for the Committee on the Walker Prizes,
Boston, Mass."

Each memoir must be accompanied by a sealed envelope enclosing the author's name, and superscribed by a motto corresponding to one borne by the manuscript.

Boston, May, 1865.

Appendix C.

LIST OF THE OFFICERS FOR 1864–5.

President.
Jeffries Wyman, M.D.

Vice-Presidents.
Charles T. Jackson, M.D., Augustus A. Gould, M.D.

Corresponding Secretary.
Samuel L. Abbot, M.D.

Recording Secretary.
Samuel H. Scudder.

Treasurer.
Thomas T. Bouvé.

Librarian.
Samuel H. Scudder.

Custodian.
Samuel H. Scudder.

Curators.

Thomas T. Bouvé,	*Of Geology and Palæontology.*
Charles J. Sprague,	*Botany.*
Thomas M. Brewer, M.D.,	*Oology.*
Henry Bryant, M.D.,	*Ornithology.*
F. W. Putnam,	*Ichthyology.*
James C. White, M.D.,	*Mammalogy and Comparative Anatomy.*
Samuel H. Scudder,	*Entomology.*
B. Joy Jeffries, M.D.,	*Microscopy*
Francis H. Brown, M.D.,	*Herpetology.*
Charles Pickering, M.D.,	*Ethnology.*
William T. Brigham,	*Mineralogy.*
Alpheus Hyatt,	*Conchology.*
A. S. Packard, Jr.,	*Crustacea.*
A. E. Verrill,	*Radiata.*

Appendix D.

LIST OF SOCIETIES, ETC., TO WHOM OUR PUBLICATIONS ARE SENT.

Albany Institute	Albany.
New York State Library	"
Berwickshire Naturalists' Club	Alnwick.
Naturforschende Gesellschaft des Osterlandes	Altenburg.
Genootschap Natura Artis Magistra	Amsterdam.
Koninklijke Akademie van Wetenschappen	"
Société Paléontologique de Belgique	Anvers.
Naturhistorischer Verein	Augsburg.
Maryland Academy	Baltimore.
Naturforschende Gesellschaft	Bamberg.
Naturforschende Gesellschaft	Basel.
Bataviaasch Genootschap van Kunsten en Wetenschappen	Batavia.
Natuurkundige Vereeniging in Nederlandsch Indie	"
Natural History and Philosophical Society	Belfast.
Bergens Museum	Bergen.
Archiv für Anatomie, Physiologie, und wissenschaftliche Medicin	Berlin.
Archiv für Naturgeschichte	"
Deutsche Geologische Gesellschaft	"
Entomologischer Verein	"
Gesellschaft für Erdkunde	"
Königlich-Preussische Akademie der Wissenschaften	"
Verein für Beförderung des Gartenbaues	"
Naturforschende Gesellschaft	Bern.
Naturwissenschaftlicher Verein des Harzes	Blankenberg.
Imperial Regio Istituto Geologico	Bologna.
Reale Accademia delle Scienze	"
Bombay Geographical Society	Bombay.
Royal Asiatic Society	"
Naturhistorischer Verein des Preussischen Rheinlandes	Bonn.
Académie Impériale des Sciences, Belles-Lettres et Arts.	Bordeaux.
Société des Sciences Physiques et Naturelles	"
Société Linnéenne	"
American Academy of Arts and Sciences.	Boston.
Boston Medical and Surgical Journal	"
Horticultural Society	"
Kön. Kais. Maerisch-Schlesische Gesellschaft für Beförderung des Akerbaus, der Natur und Landeskunde	Brünn.
Naturforschender Verein.	"
Académie Royale des Sciences, des Lettres et des Beaux-Arts	Bruxelles.
Société Entomologique de Belgique	"
Académie Royale des Sciences, Arts et Belles-Lettres	Caen.
Société Linnéenne de Normandie	"
Agricultural and Horticultural Society of India	Calcutta.

Asiatic Society of Bengal	Calcutta.
Geological Survey of India	"
Cambridge Philosophical Society	Cambridge, Eng.
Harvard Natural History Society	" Mass.
Museum of Comparative Zoölogy	" "
Journal für Ornithologie	Cassel.
Accademia Gioenia di Scienze Naturali	Catania.
Société Impériale des Sciences Naturelles	Cherbourg.
Elliott Society of Natural History	Charleston.
Kongelige Norske Frederiks Universitet	Christiania.
Naturforschende Gesellschaft Graubündtens	Chur.
Naturforschende Gesellschaft	Danzig.
Mittelrheinischer Geologischer Verein	Darmstadt.
Académie Impériale des Sciences, Arts et Belles-Lettres.	Dijon.
Archiv für die Naturkunde, Lief- Est- und Curlands	Dorpat.
Kais. Leopoldinisch-Carolinische Deutsche Akademie der Naturforscher	Dresden.
Naturwissenschaftliche Gesellschaft, Isis	"
Dublin Botanical Society	Dublin.
" Quarterly Journal of Science	"
" University Philosophical Society	"
Natural History Society	"
Royal Dublin Society	"
" Geological Society of Ireland	"
" Irish Academy	"
University Zoölogical and Botanical Association	"
Royal Scottish Society of Arts	Edinburgh.
Royal Society of Edinburgh	"
Naturforschende Gesellschaft	Emden.
Senckenbergische naturforschende Gesellschaft	Frankfurt a. M.
Zoologische Gesellschaft	"
Naturforschende Gesellschaft	Freiburg.
Société de Physique et d' Histoire Naturelle	Genève.
Oberhessische Gesellschaft	Giessen.
Naturforschende Gesellschaft	Görlitz.
Königliche Gesellschaft der Wissenschaften	Göttingen.
British Association for the Advancement of Science	Great Britain.
Hollandsche Maatschappij der Wetenschappen	Haarlem.
Real Sociedad Economica de Amigos del Pais	Habana.
Nova Scotian Institute of Natural Science	Halifax, N. S.
Linnaea, ein Journal für die Botanik in ihrem ganze Umfange	Halle.
Naturwissenschaftlicher Verein	"
Naturwissenschaftliche Gesellschaft	Hamburg.
Naturwissenschaftlicher Verein	"
Naturhistorische Gesellschaft	Hannover.
Naturhistorisch-Medicinischer Verein	Heidelberg.
Finska Vetenskaps Societeten	Helsingfors.
Siebenbürgischer Verein für Naturwissenschaften	Hermannstadt.
Provinciaal Genootschap van Kunsten en Wetenschappen	Hertogenbosch.
Tasmania Royal Society	Hobarttown.

Asiatic Society of China	Hong Kong.
Royal Hawaiian Agricultural Society	Honolulu.
Ferdinandeum	Innsbruck.
Imper. Kazanskii Universitet	Kazan.
Jamaica Society of Arts	Kingston.
Det Kongelige Danske Videnskabernes Selskab	Kjobenhavn
Kongelige Nordiske Oldskrift Selskab	"
Naturhistorisches Landesmuseum von Kaernten	Klagefnurt.
Kön. Physikalisch-Ökonomische Gesellschaft	Königsberg.
Société Entomologique des Pays-Bas	La Haye.
Geological and Polytechnic Society of the West Riding of Yorkshire	Leeds.
Philosophical and Literary Society	"
Academia Lugduno-Batava	Leyden.
Nederlandsche Entomologische Vereeniging	"
Königlich Saechsische Gesellschaft der Wissenschaften	Leipzig.
Zeitschrift für wissenschaftliche Zoologie	"
Société d'Agriculture, Sciences et Arts de la Sarthe	Le Mans.
Société Royale des Sciences	Liège.
Société des Sciences, d'Agriculture et des Arts	Lille.
Academia Real das Sciencias	Lisboa.
Literary and Philosophical Society	Liverpool
Liverpool Royal Institution	"
Museum Francisco-Carolinum	Linz.
Annals and Magazine of Natural History	London
Entomological Society	"
Entomologist's Weekly Intelligencer	"
Ethnological Society	"
Geological Society	"
India Museum	"
Journal of Entomology	"
Linnæan Society	"
London, Edinburgh and Dublin Philosophical Magazine	"
Microscopical Society	"
Museum of Practical Geology and Geological Survey	"
Natural History Review	"
Palæontographical Society	"
Royal Agricultural Society of England	"
" Geographical Society	"
" Horticultural Society	"
" Institution of Great Britain	"
" Society	"
The Athenæum	"
" Ibis	"
" Reader	"
" Zoölogist	"
Zoölogical Society	"
Naturwissenschaftlicher Verein.	Luneburg.
Société des Sciences Naturelles du Grand-Duché de Luxembourg	Luxembourg.
Académie Impériale des Sciences, Belles-Lettres et Arts	Lyon.

Société d' Agriculture, d' Histoire Naturelle et des Arts Utiles	Lyon.
Société Linnéenne	"
Wisconsin Natural History Society	Madison, Wis.
Literary Society and Auxiliary of the Royal Asiatic Society	Madras.
Academia Real de Ciencias	Madrid.
Literary and Philosophical Society	Manchester.
Mannheimer Verein für Naturkunde	Mannheim.
Gesellschaft für Beförderung der Gesammten Naturwissenschaften	Marburg.
Philosophical Institution of Victoria	Melbourne.
Société d' Histoire Naturelle du Départment de la Moselle	Metz.
Zeeuwsch Genootschap der Wetenschappen	Middleburg.
Imperiale Regio Istituto Lombardo di Scienze, Lettere ed Arti	Milano.
Museo dei Fratelli Villa	"
Società Italiana di Scienze Naturali	"
Società Italiana delle Scienze	Modena.
Société des Sciences, des Arts et des Lettres du Hainault	Mons.
Académie des Sciences et Lettres	Montpellier.
Canadian Naturalist and Geologist	Montreal.
Geological Survey of Canada	"
Société Impériale des Naturalistes	Moscou.
Königlich Bayerische Akademie der Wissenschaften .	München.
Königlich Hof-und-Staatsbibliothek	"
Real Accademia delle Scienze e Belle Lettere	Napoli.
Verein der Freunde der Naturgeschichte in Mecklenburg	Neubrandeburg.
Société des Sciences Naturelles	Neuchâtel.
Die Pollichia zu Dürkheim a. H. Rheinpfalz . . .	Neustadt.
American Journal of Science and Arts	New Haven.
Lyceum of Natural History	New York.
Naturhistorische Gesellschaft	Nurnberg.
Obshtshestvo Seljskago Khozjaistva Juzhnoi Rossii . .	Odessa.
Offenbach Verein für Naturkunde	Offenbach am Main.
Ashmolean Society	Oxford.
Imperiale Regia Accademia di Scienze, Lettere, ed Arti .	Padova.
Accademia delle Scienze e belle Lettere	Palermo.
Reale Istituto d' Incoraggiamento di Agricoltura, Arti, e Manifatture in Sicilia	"
Académie Impériale des Sciences	Paris.
École des Mines	"
Journal de Conchyliologie	"
Ministère de la Marine	"
Muséum d' Histoire Naturelle	"
Revue de Séricículture Comparée	"
Revue et Magazin de Zoologie	"
Société de Géographie	"
" des Antiquaires de France	"
" Entomologique de France	"
" Géologique de France	"

Société Impériale et Centrale d' Agriculture . . .	Paris.
" Impériale Zoologique d' Acclimatation . .	"
Royal Geological Society of Cornwall	Penzance.
Academy of Natural Sciences	Philadelphia.
American Philosophical Society	"
Society of Natural History	Portland.
Königlich Boehmische Gesellschaft	Prag.
Lotos, Zeitschrift für Naturwissenschaften . . .	"
Kön. Kais. Patriot-Okonomische in Böhmen . . .	"
Verein für Naturkunde	Presburg.
Literary and Historical Society.	Quebec.
Correspondenzblatt für Sammler von Insekten. . .	Regensburg.
Kön. Bayerische Botanische Gesellschaft	"
Zoologisch-Mineralogischer Verein	"
Naturforschender Verein	Riga.
Bataavsch Genootschap der Prœfondervindelijke Wijsgeeberte	Rotterdam.
St. Gallische Gesellschaft	St. Gallen.
Natural History Society of New Brunswick . . .	St. Johns, N. B.
Académie Impériale des Sciences	St. Pétersbourg.
Bibliothèque Impériale Publique	"
État Major du Corps des Ingénieurs des Mines de Russie	"
Gidrographitsheskii Departament Morskago Ministerstva	"
Imper. Russkoe Geographitsheskoe Obshtshestvo . .	"
Russisch-Kaiserliche Mineralogische Gesellschaft . .	"
Société Entomologique de Russie	"
Essex Institute	Salem, Mass.
Kön. Kais. Landwirthschaft Gesellschaft	Salzburg.
California Academy of Natural Sciences	San Francisco.
Universidad de Chile.	Santiago.
Skandinaviske Naturforskeres Forsamling . . .	Scandinavia.
Entomologischer Verein	Stettin.
Bureau de la Recherche Géologique de la Suède . .	Stockholm.
Kongliga Svenska Vetenskaps Akademien	"
Société d' Histoire Naturelle	Strasbourg.
Deutsche Ornithologe Gesellschaft	Stuttgart.
Verein für Vaterländische Naturkunde	"
Schweizerische Entomologische Gesellschaft . . .	Switzerland.
Société Vaudoise des Sciences Naturelles. . . .	"
Königlich Saechsische Akademie für Forst-und Landwirthe	Tharand.
Reale Accademia delle Scienze.	Torino.
Canadian Institute	Toronto.
Académie des Sciences, Inscriptions et Belles-Lettres .	Toulouse.
Kongliga Vetenskaps Societeten	Upsala.
Provinciaal Utrechtsch Genootschap van Kunsten en Wetenschappen	Utrecht.
Istituto Veneto di Scienze, Lettere ed Arti . . .	Venezia.
Accademia d' Agricoltura, Commercio ed Arti . .	Verona.
Smithsonian Institution	Washington, D. C.
Kaiserliche Akademie der Wissenschaften . . .	Wien.

Kön. Kais. Central-Anstalt für Meteorologie und Erdmagnetismus	Wien.
Kön. Kais. Geologische Reichsanstalt	"
Kön. Kais. Zoölogisch-Botanische Gesellschaft. . . .	"
Wiener Entomologische Monatschrift	"
Verein für Naturkunde	Wiesbaden.
American Antiquarian Society.	Worcester, Mass.
Würzburger naturwissenschaftliche Zeitschrift . .	Würzburg.
Naturforschende Gesellschaft	Zurich.

Dr. **Thos. T. Bouvé, Treasurer, in account with the Boston Society of Natural History.** Cr.

Date		Amount
1864. April 30.	To Balance of Cash on hand at date . .	$4,118.19
1865. April 30.	" Cash received during past year, as follows:	
	Subscription to the Walker Fund . .	33,405.00
	Boston City Stock sold	8,396.99
	Return of amount temporarily loaned .	905.00
	Interest on temporary loan . . .	14.00
	State of Massachusetts, return of loans .	57,105.00
	City of Boston, return of loan . .	4,000.00
	Trustees of Courtis Fund, borrowed of them	8,339.71
	Income from Courtis Fund	436.33
	Share of Income from Walker Fund to date, one-half	613.48
	Life Membership	100.00
	Special Donation	100.00
	Annual Assessments	1,010.00
	Admission Fees	150.00
	General Expenses, Sundries sold, etc., .	12.06
	Journal and Proceedings, Publications .	197.97
	Library, received from Books sold . .	646.78
		$119,550.51
	Balance due to the Treasurer on date .	397.05
		$119,947.56

Date		Amount
1865. April 30	By Cash paid as follows:	
	New Building, paid on this account .	$10,022.25
	Furniture for New Building, Cases, etc. .	2,504.87
	Journal and Proceedings	129.04
	General Expenses	3,014.38
	Cabinet	838.32
	Library, paid on this account . . .	71.89
	Loaned temporarily	905.00
	State of Massachusetts, Loans to State .	57,105.00
	City of Boston, Loaned them . . .	4,000.00
	Bills Receivable, Loaned on Notes secured by Mortgages, being the whole amount of Walker Fund	41,105.00
	Interest paid on this account . . .	251,81
		$119,947.56

Errors Excepted.

THOS. T. BOUVÉ, Treasurer.

Boston, April 30, 1865.

Dr. Thos. T. Bouvé, Treasurer, in account with the "Walker Fund" of the Boston Society of Natural History. **Cr.**

Date	Dr.	Amount	Date	Cr.	Amount
1864. Dec. 29.	To Cash received 2 months 26 days on $905.00 temporarily loaned	$12.97	1865. March	By Cash paid E. S. Morse for labels for specimens	$9.44
1865. Jan. 28.	" received, Interest on $4,000 loaned to the city July 28th last . .	120.00		" paid C. Richardson & Co. for Benzine, Creosote, etc.	3.32
	" received, Interest on $16,000 loaned to State June 25th last, 5 per cent. until July 27th, 6 per cent. July 27th to date	556.90		" paid repairs Skylight	16.08
March 1.	" received, Interest on $20,000 loaned the State Nov. 22d last, 6 per cent.	325.48		" paid Wood & Chester for Bird-stands	30.00
April 8.	" received, Interest on $21,105 from Jan. 28th to March 1st, and on $16,105 from March 1st to date, 6 per cent.	211.62		" paid Moses French for Coal . .	324.33
				" paid Prescott & Chapin for Coal .	64.12
				" paid C. Graves for Alcohol . .	19.25
				" paid and transferred to the General Accounts of the Society, one-half of all Income received to date .	613.48
					$1,080.02
			April 30.	By Balance on date to new account . .	146.95
		$1,226.97			$1,226.97

Errors Excepted.

THOS. T. BOUVÉ, Treasurer.

Boston, April 30, 1865.

DR. THOS. T. BOUVÉ, TREASURER, IN ACCOUNT WITH THE BULFINCH STREET ESTATE. CR.

1864. October.	To Cash received of Mrs. E. N. Clarke, for rent of House and Barn one year from Oct. 14th, 1864, to Oct. 14th, 1865, in advance	$940.00	1864. October.	By Cash paid J. Jeffries, Jr., for advertising Estate to let, and for Revenue Stamps to Lease	$16.37
			Nov. 23.	" paid City and State Tax for year, one-half of which is to be repaid by Mrs. Clarke per agreement .	266.00
1865. April 30.	" received of Mrs. E. N. Clarke, for one-half amount tax for 1864, as agreed upon	133.00	1865. Feb. 7.	" paid D. Tillson for Slating . .	44.02
			March.	" paid Neptune Ins. Co., for Insurance on Building	15.00
		$1,073.00			$341.39
			April 30.	" Balance on date to new account .	731.61
					$1,073.00

Errors Excepted.

THOS. T. BOUVÉ, Treasurer.

Boston, April 30, 1865.

It will be perceived that there is in the hands of the Treasurer, in

account with the Walker Fund, a balance of . . .	$146.95
In his hands in acc't with the Bulfinch St. Estate . .	731.61
Together, . .	$878.56
And that there is a balance due him on general acc't of .	397.05
Making the actual balance in his hands . . . . . of all the acc'ts rendered.	$481.51

NEW BUILDING AND CASES.

The full cost of our New Building, including commissions for architectural services, and not including the cases, has been	$94.393.80
The cases, including architect's commissions, have cost	10,003.36
Making together . .	$104,397.16

A result with which the Society certainly has reason to be gratified as such a building, with the cases, could not now be built for a sum less than one hundred and fifty to one hundred and sixty thousand dollars.

PROPERTY OF THE SOCIETY.

As Treasurer of the Society I reported the property May 1st, 1862,

as worth, exclusive of the Library and Cabinet, .	$85,001.49
May 1st, 1863, it was valued at	133,497.80
May 1st, 1864 it was valued at	142,512.47
and now, May 1st, 1865, it sums up	176,881.51

This consists of

The Estate in Bulfinch Street . . .		$30,000.00	
Courtis Fund		10,000.00	
New Building		94,393.80	
Furniture		10,095.05	
Balance due on unsettled account . .		24.42	
Walker Fund		41,105.00	
		$185,618.27	
Less due to Trustees of			
Courtis Fund, borrowed,	$8,339.71		
And to the Treasurer . .	397.05	8,736.76	
			$176,881.51

This is, as stated above, exclusive of Library and Cabinet. I will not undertake to estimate the value of our property in the estate of our late benefactor, Dr. Wm. J. Walker. It suffices me to know that in resigning the office of Treasurer, I leave to my successor the pleasing task of showing, on our next anniversary, means of usefulness beyond what our most sanguine anticipations could have looked for.

With regard to the income that can be depended upon from our present property and from assessments on members, &c., I present the following as approximate results:

From Estate Bulfinch Street	$1,000
" Assessments on members	1,000
" Courtis Fund (note of $3,000)	180
" Walker Fund (notes of $41,105)	2,466
" Admission fees of new members	200
Making in all	$4,846
Of this, however, one half of the income from the Walker fund is not available for general purposes. Deduct this	1,233
And we have for general purposes	$3,613

Our expenses as we are now going on may be estimated as follows:

Custodian and Janitor	$1,500
Other assistance	200
Stationery, printing, cards, &c.	300
Expressage, transportation, &c.	100
Coal, &c.	500
Gas and Water	100
Insurance	75
Repairs	200
Sundries not mentioned	200
Making	$3,175

This, of course, is a rough estimate, and the actual amount may be less or more according as economy is regarded. Allowing our receipts and expenditures to be as indicated, there would be something, say $500 left for publications and purchase of specimens. This is all based, however, upon circumstances being much as at present, our house in Bulfinch Street let and no change in management. Of course, with the expected accession of wealth and the projected changes in our operations these figures may have but little value.

The one half of the Walker Fund not available for general purposes, may in part be used for a portion of the estimated expenses above, but probably not enough of it to vary essentially the result.

Mr. Edward Pickering, on behalf of the Auditing Committee, stated that they had examined the accounts of the Treasurer and found them correctly cast and properly vouched, and had signed statements to that effect upon the books.

The Secretary read a letter addressed to the President from the Curator of Botany, Mr. Sprague, resigning that office, giving an account of the vast progress in his department during the twelve years that he had charge of it, and the amount of work expended upon it, and suggesting the name of Mr. Horace Mann as his successor.

The following gentlemen were then declared elected Officers of the Society for the year 1865–6:

PRESIDENT,
JEFFRIES WYMAN, M.D.

VICE-PRESIDENT.
CHARLES T. JACKSON, M.D., AUGUSTUS A. GOULD, M.D.

CORRESPONDING SECRETARY,
SAMUEL L. ABBOT, M.D.

RECORDING SECRETARY,
SAMUEL H. SCUDDER.

TREASURER,
EDWARD PICKERING.

LIBRARIAN,
SAMUEL H. SCUDDER.

CUSTODIAN,

CURATORS,

THOMAS T. BOUVÉ,	OF GEOLOGY AND PALEONTOLOGY.
THOMAS M. BREWER, M.D.	OÖLOGY.
HENRY BRYANT, M.D.,	ORNITHOLOGY.
F. W. PUTNAM,	ICHTHYOLOGY.
JAMES C. WHITE, M.D.,	MAMMALOGY AND COM. ANATOMY.
SAMUEL H. SCUDDER,	ENTOMOLOGY.
B. JOY JEFFRIES, M.D.,	MICROSCOPY.
FRANCIS H. BROWN, M.D.,	HERPETOLOGY.
CHARLES PICKERING, M.D.,	ETHNOLOGY.
ALPHEUS HYATT,	CONCHOLOGY.
A. S. PACKARD, JR.,	CRUSTACEA.
A. E. VERRILL,	RADIATA.
THOMAS T. BOUVÉ,	MINERALOGY.
HORACE MANN,	BOTANY.

The Nominating Committee brought in a list of names as candidates for office during the ensuing year, leaving the office of Custodian vacant, and asking that further time might be given them for that appointment. They also suggested that, in consideration of the amount of property now held by the Society, and the great increase expected, a committee of three be chosen to act as Trustees.

On motion of Dr. J. C. White, the thanks of the Society were unanimously voted to Mr. Bouvé, Treasurer, for his able and untiring services during his tenure of the office.

On motion of Dr. J. B. S. Jackson, the thanks of the Society were unanimously voted to Mr. Sprague for the efficient and laborious efforts bestowed by him during the last twelve years in the care of the Botanical Collection.

The proposition of the Nominating Committee for the appointment of Trustees, was then taken up, and Mr. Bouvé gave notice that the necessary change in the By-Laws to allow of Trustees would be brought up at the next meeting. After some discussion it was voted, on motion of Mr. Stodder, that a Committee of three be chosen, to be nominated by the Chair, who should draw up the necessary amendment to the By-Laws, and report at the next meeting. The Chair nominated the Treasurer, and Messrs. Bouvé and Sprague; and they were elected.

On motion of Dr. H. W. Williams, it was voted that the Committee on Nominations be requested to bring in at the next meeting the names of two other persons besides the Treasurer to act as Trustees.

The Report of the Building Committee being called for, Mr. Bouvé announced on their behalf that the full cost of the new building, including commission for architectural services, and not including the cases, has been $94.393.80, and that the cases, including architect's commissions, have cost $10,003.36, making a total of $104,397.16, a result with which the Society certainly has reason to be gratified, as such a building with the cases could not now be built for a sum less than $150,000 to $160.000. With this report the Committee ask the Society to accept of the building and discharge them from further duty.

The Society voted to accept the report, and discharge the Committee, with their thanks.

The Committee, appointed by the Council, upon the Walker Prizes, announced that a circular had been prepared, which was distributed to the members present.

On motion of Dr. J. B. S. Jackson, the Society voted to invite the Massachusetts Medical Association to visit the Museum during their coming Session in this city.

The Secretary read the following list of letters received since the last announcement: —

From the Royal Society of London, July 27th, 1864; the Naturhistorischer Verein der preussischen Rheinlande und Westphalens, October 26th, 1864; the Athenæum, London, Nov. 3d, 1864; the Bataafsch Genootschap der Prœfondervindelijke Wijsbegeerte te Rotterdam; the Naturforschende Gesellschaft zu Basel; the Senckenbergische Naturforschende Gesellschaft, Frankfurt, a. M.; the Naturwissenschaftliche Verein, Luneburg; the Entomological Society of London, and the Smithsonian Institution, Washington, Dec. 13th, 1864; the Kongelige Danske Videnskabernes Selskab, Kjöbenhavn, Dec. 27th, 1864, acknowledging the receipt of the Society's publications; the Linnean Society, London, October 7th, 1864; the St. Gallischen naturwissenschaftliche Gesellschaft, St. Gallen; and the Real Academia de Ciencias, Madrid, October 26th, 1864; the Naturforschende Gesellschaft in Emden, the Naturhistorischer Verein in Augsburg, the Académie Royale des Sciences à Amsterdam; the Kaiserliche Akademie der Wissenschaften, Wien; the Accademia delle Scienze dell' Istituto di Bologna; the Königliche Sächsische Gesellschaft der Wissenschaften, Leipzig; and the Société des Sciences de Finlande, Helsingfors, December 13th, 1864, acknowledging the same and presenting their own publications; the Académie Impériale des Sciences, etc., de Lyon, February 1st, 1864; the Geological Survey of India, June 20th, and Nov. 5th, 1864; the Sociéte Impériale d'Agriculture, etc., de Lyon, Aug. 24th, 1864; the Naturhistorische Gesellschaft zu Nürnberg, Sept. 20th, 1864; the Naturwissenschaftlicher Verein, Hamburg; the Königliche-Preussische Akademie der Wissenschaften, Berlin, and the Naturforschende Gesellschaft, Frankfurt, a. M., Oct. 26th, 1864; the Albany Institute, Albany, N. Y., November 2d, 1864; and the Société Royale des Sciences à Upsal, December 13th, 1864, presenting their publications; the Naturhistorische Gesellschaft zu Hannover, October 26th, 1864, presenting their publications and asking for back numbers of the Society's; Bibliotheca Universitatis Lugduno-Batavæ, December 13th, 1864, acknowledging the receipt of the Society's publications and asking for back numbers of the same; also from Mr. George W. Tryon, Jr., Philadelphia, September 21st, 1864; and Mr. John T. Gulick, Hong Kong, December, 7th, 1864, acknowledging their election as Corresponding Members; and from the Secretary of the Convention of Young Men's Christian Associations of the United States and British Provinces, June 16th, 1864, acknowledging courtesies tendered by the Society to their Delegates during a recent visit to Boston.

The following gentlemen were elected Resident Members: John Ritchie, Esq., of Brookline; Messrs. Charles E. and Walter Faxon, of Jamaica Plain; Mr. Joshua G. Nickerson, of this city, and Mr. Charles H. Tweed, of Cambridge.

DONATIONS TO THE MUSEUM.

October 5. *Chelydra serpentina* from near Boston, by Mr. T. T. Bouvé; *Cistudo virginica*, Wilmington, Mass., by Mr. L. L. Holden. Galena from the Hampton Mines, Northampton, Mass., by Mr. W. T. Eustis. *Tænia solium*, by Mr. Fox. Collection of fourteen specimens of fish, eleven specimens of reptiles, four insects, *Anacardium occidentale*, etc., eight specimens, from San Juan de los Remedios, Cuba, by Mr. N. H. Bishop. Thirty-eight specimens of fish from the Milwaukee river, Wis.; two hundred specimens of fish, from Lake Goodwin, Marquette Co., Mich.; fifty-seven specimens of Unionidæ from Kankaka, Kankakee river; twenty-six specimens of minerals and seventeen specimens of fossils, from Nova Scotia; three stalactites, from Yellowstone river, Nebraska; four specimens of fossils and minerals, from Maine; seventy-three specimens of fossils and minerals from Northern Michigan; two rock specimens from New Hampshire; eleven minerals from Massachusetts; forty-five specimens of fossils and minerals, from Illinois; nineteen geological specimens, from Europe, and three from St. Josephs, Mo.; an Indian arrow-head, from a mound near Chicago, Ill.; anthracite, from Reading, Pa.; minerals, from Calcutta, and Valparaiso, South America; sixty-six specimens iron ore and rock specimens and a fish-hawk, from Marquette Co., Mich.; fifteen specimens of insects from Goodwin Lake, Mich., by Mr. W. H. Dall. *Menobranchus maculatus*, Chicago river, by Mr. Samuel Clark. Sixty-two specimens of Mollusca, by Mr. Charles A. Johnson. A book containing twenty-nine specimens of sea-mosses, from Lynn Beach, by Mr. N. Willis. *Corydalis cornutus*, from Lynn, by Mr. W. L. Parker.

October 19. Base of lower jaw of Sperm whale, by Mr. W. P. Kuhn. Two Indian crania, a stone mortar and two pestles, from Stockton, Cal., by Dr. C. F. Winslow. An Indian stone household implement from Sandwich, Mass., and three fossil bones from Gay Head, Martha's Vineyard, by Mr. E. A. Brigham. Seven specimens Arachnida and Myriapoda from the Isle of Pines, by Mr. S. H. Scudder.

November 2. Batrachus from Cohasset, by Dr. H. Bryant. Twenty-six specimens of Fishes and Reptiles from Pennachenee Lake, Maine, by Messrs. E. F.

Snow and H. C. Whittier. *Phalaropus Wilsonii* in breeding plumage, by Mr. Thure Kumlein. Seven specimens of insects and thirty-four Helices, from Hartt's Location, White Mountains, N. H., by Dr. S. A. Bemis. Two deformed lobster "claws" from Provincetown, Mass., by Capt. N. E. Atwood. A number of casts of fossils, from Prof. H. A. Ward, by exchange. A Lizard and its eggs, from La Hueca on the River Chira, near the Bay of Paita, S. A.; two Lizards from the cliffs on the Bay of Paita, S. A.; two Sepiæ, from the Bay of Paita; two frogs collected between the borders of Equador and Quito, taken at an elevation of 9,000 feet above the sea; an Annelid, Equador, taken at an elevation of 7,000 to 8,000 feet; one hundred and sixty-seven specimens of insects, from Equador, by Dr. C. F. Winslow. Pemmican, from the Red River Settlements, British North America, by Mr. S. H. Scudder. *Cyanurus cristatus* and *Icterus Baltimori*, from near Boston, by Mr. E. A. Brigham. Six specimens of Copper and Lead ores from Middletown, Conn.; Peat, from Lexington, Mass., by Dr. C. T. Jackson.

November 16. Thirty-three Mexican masks, by the Smithsonian Institution, forty-five specimens of fossil bones, from Riobamba, S. A.; a Crustacean, from Mansanilla, Mexico; *Brenthus* taken on shipboard in the Gulf of Mexico, by Dr. C. F. Winslow. Lignite, from Dutch Gap Canal, James River, Va., by Dr. S. A. Green. Salamander, from Jamaica Plain, by Mr. R. Scott. *Procyon lotor*, Raccoon, living, by Dr. W. E. Coale. Silver sword grass, from Mauna Loa, Sandwich Islands, by Miss Kingman. Brucite and Pyromorphite, from Pennsylvania, by Mr. E. L. Sturtevant. Skull of Polar Bear, *Ursus maritimus*, from Hudson's Bay, by W. M. Thompson. Two seed vessels, by Mrs. Fielding. Romalea, from Jacksonville, Florida, by Mr. A. L. Miller. Ostræa, from the Southern States, or West Indies, by Mr. S. H. Scudder. Twenty-nine specimens of nests and eggs of birds, collected by Xanthus and others in Mexico and West Indies; four hundred and ninety-six specimens of land shells, from Matanzas and Flor de Cayo near Remedios, Cuba; fifty-six specimens of Lepidoptera, from Flor de Cayo, Cuba; five hundred and nine specimens of Mollusca, from Cape St. Lucas; sixty-one specimens of Mollusca, from Cardenas, Cuba; a small collection of skulls and sternal bones of birds from Massachusetts, Labrador and the Bahama Islands; seventy-three alcoholic specimens of Mollusca, and one hundred and eighty-five alcoholic specimens of Insects from San Juan de los Remedios, Cuba; one hundred and seventy-five Lepidoptera, from France and Switzerland; three hundred and fifty-five insects, mostly coleopterous, from Algeria; two hundred and seventy-eight specimens of Coleoptera, from France; one hundred and ninety-four native insects, by Dr. H. Bryant. Snake and tree toad, from Petersburg, Va., by M. F. Andernach. Two hundred and twenty-seven specimens of Mollusca from Cuba, by Señor D. Francisco Jimeno. Twenty-six specimens of fossils from St. Albans, Vt., Madison and Canaan, Me., by Mr. L. Hills.

December 7. Model of a Diamond, from North Carolina, by Dr. A. A. Gould. Lignite, from Dutch Gap Canal, Va., by Dr. Thomas B. Hitchcock. Eighteen specimens of coal plants from Pennsylvania, eleven samples of coal, from Plymouth, Pa., by Dr. C. T. Jackson. One hundred and seventeen specimens of Mollusca, probably from Cape de Verde Islands, by Mr. N. H. Bishop. Four specimens of jaws and vertebræ of sharks and the sword fish, from Provincetown, Mass., by Capt. N. S. Atwood. Part of the lower jaw of the moose, from Lake Superior, by Mr. Todd. Organic tissues of *Elephas primigenius* Blum., from the Lena river, Siberia, by Dr. W. Channing. Skull of Beaver, from Lake Superior, by Mr. W. H. Dall. *Diaphomera femorata*, from Boston, by Mr. C. J. Sprague. *Eupyrgus scaber*, twenty-five specimens of *Turritella reticulata* Mighels; thirteen specimens of *Ophioglypha nodosa* Lyman, from Labrador, by A. S. Packard, Jr. Five hundred and seventy seeds of plants, from Burmah, E. I., by Rev. Dr. Francis Mason. Fifty specimens of copper, lead and silver ores, from South America; two Indian hatchets, from Bordentown, N. J.; Wheat and Barley, from Egyptian mummies; fossil mollusk, from mine at Huantajaya, Peru, S. A.; spindle and cotton from Quilca, Peru, purchased by subscription at the Sailor's Fair.

December 21. Fourteen specimens of rocks and minerals, from Chester, Mass., by Dr. C. T. Jackson. Ten specimens of Carnelian, from the mountains west of Madras, India; Geode from volcanic scoriæ, from Aden on the Red Sea, by Mr. W. H. Dall. Twenty-three specimens of Crustacea, from England; Infusorial earth, from Cornwallis, Nova Scotia, twenty-eight bird's eggs, from Nova Scotia; Sargasso weed, eight specimens of Crustacea, one Annelid, two Echinoderms, forty-six Mollusca, and claw of a gigantic Lobster, all from Sable Island, coast of Nova Scotia, by Mr. J. R. Willis. Skull and bones of a Shark, from the Atlantic Ocean, south of the Gulf Stream; bones of another species, from the Pacific Ocean, one thousand miles north of Isthmus of Panama; three Reptiles and two Scorpions, from Tule, one hundred and eighty miles north of Mazatlan, by Mr. J. Robertson.

January 4, 1865. Anastase, from Smithfield, R. I., by Rev. E. B. Eddy. Specimens of dry goods, destroyed by spontaneous combustion; four specimens of *Paludina*, from Duval Bluff, Lake Munroe, Fl.; a Stone Hatchet, from Grafton, Mass., by Mr. E. A. Brigham. Six insects and an Echinoderm, from Paita, Peru, by Dr. C. F. Winslow. Fossil Shark's tooth, from near the Petersburg and Richmond, Va., Railroad, by Dr. S. A. Green. *Lynx canadensis*, from Umbagog Lake, Maine, by Mr. J. G. Rich. Two specimens of Orthoptera, twenty-two Neuroptera, nineteen Hemiptera, one hundred and fifteen Coleoptera, forty-eight Diptera, thirty-five Lepidoptera, two hundred and thirty Hymenoptera, twelve Myriapoda, six Annelids, one hundred and sixty Mollusca, sixteen Salamanders, sixteen eggs of Tropidonotus, five bird's eggs, nine hundred fish, and forty other zoölogical specimens from Northern Maine, by Mr. F. W. Putnam. An abnormal specimen of the Orange, by Mr. R. H. Eddy.

January 18. Casts of *Ichthyosaurus communis* and *Castor ohioënsis*, received in exchange from Prof. H. A. Ward. Sixteen Birds, from Massachusetts, by Dr. Aten. Duck, from the East Indies, by Mr. P. A. Gidney. A Varied Thrush, shot in Ipswich, Mass, by Mr. James T. Smith. Twenty-three eggs of North American birds; *Presbytis*, from Siam, by Mr. W. L. Parker. Skull of a Porpoise, from the Mediterranean, jaw of a Shark, a Frog, two birds, seven reptiles, two Salamanders, two Centipedes from Cape Haytien, one fish and a fungus, by Dr. B. S. Shaw.

February 1. Calcite, from Martinsburg, N. Y., by Dr. C. T. Jackson. Thirty-four eggs of North American Birds, three specimens of *Sturnella magna*, three specimens of *Quiscalus versicolor*, *Arvicola xanthognathus*, from Yukon River, two hundred miles south-west of Porcupine River; *Scalops argentatus*, from Peoria, Ill.; *Eremophila cornuta*, from San Diego, Cal.; *Pica ludoviciana*, *Pica hudsonica*, *Cyanura macrolophus* and *Ægralites vociferus*, *Tyrannus verticalis*, *Pipilo arcticus*, *Hirundo lunifrons*, *Collyrio elegans*, two specimens of *Tetrao obscurus*, *Athene cunicularia*, *Falco sparverius*, *Sciurus Fremontii*, *S. Abertii*, and *Cynomys ludovicianus*, from mountains west of Denver City, Colorado Terr.; *Turdus migratorius*, from Fort Rae, Great Slave Lake; *Turdus aliciæ*, *T. Swainsonii*, *Sciurus ludovicianus*, by the Chicago Academy of Sciences. Microscopic objects, mostly Diatomaceæ from St. George's River, Maine; Neuse River, N. C.; Hull Inlet;

Mystic Pond, Mass., by Mr. R. C. Greenleaf. Diatomaceæ from a pond near White Mountain Notch, source of Saco River, by Dr. J. W. Lewis. Wing of a Lepidopterous insect, mounted as a microscopic object, by Mr. T. Nourse.

February 15. Specimens of Margarite and Emery from Chester, Mass., by Dr. C. T. Jackson. Cranium of an Inca, from Samanca, Peru, twelve Echinoderms, seventy-two Mollusca, twenty-nine Crustacea, eight Annelids, six Fish and three Reptiles, from Paita, Peru; a Myriapod and five Arachnids, from Point Galera, Ecuador; two marine Reptiles and a Fish, from the coast of Ecuador; a Crustacean and Mollusca, from the anchorage off Tumbay river, by Dr. C. F. Winslow.

March 1. Collection of one hundred and six dried plants, from the Alps, and three hundred and twenty-two native plants, by Dr. C. G. Putnam. Fifty-one Coleoptera, from the Pacific States, received in exchange, from Dr. J. L. LeConte. *Sula bassana*, Boston harbor, by purchase. Eel, from the West Indies, by Mr. D. Pulsifer. Twelve hundred and fifteen plants, from Germany, by Col. J. Howland. Twenty-four plants, from Zanzibar, Africa, by the Essex Institute.

March 15. Human Cranium, by Mr. G. R. Curtis. A living specimen of *Lycopodium lepidophyllum*, from Sonora, Mexico, and a bulb of an amaryllidaceous plant, by Mr. A. T. Hall. Two Mollusca and ten specimens of Crustacea, from California, by Mr. Samuel Hubbard. A Longicorn Beetle and eight nocturnal Lepidoptera, from Moneague, Jamaica, by Dr. H. Bryant.

April 5. Forty-four eggs of birds, from Hopedale, Labrador, by A. S. Packard, Jr. Seven sterna of Birds, three dissections of skulls of birds, fourteen Mollusca, ten Reptiles, and seven Insects, from Moneague, Jamaica. Eggs of *Clisiocampa americana* from Cohasset, Mass., by Dr. H. Bryant. Cast of the head of a Hottentot, by purchase.

BOOKS RECEIVED FROM OCT. 1864 TO MAY 3, 1865.

On introduced Species of Nova Scotia. By J. Bernard Gilpin, M. D. 8vo. Pamph. *From the Author.*

Synopsis of the Bombycidæ of the United States. By A. S. Packard, Jr. Parts I–II. 8vo. Philadelphia, 1864. *From the Author.*

Leukosin. A new Substance found in the Blood of Leukaemia. Also a Description of another Crystalline Body, found in the Vomitus. By James C. White, M. D. 8vo. Pamph. Boston, 1859. *From the Author.*

Illustrations of the Birds of California, Texas, Oregon, British and Russian America. By John Cassin. Nos. VI, IX and X. 8vo. Philadelphia, 1855. *From the Author.*

Die Philosophie in Cyclus der Naturwissenschaften. Von Dr. Adolph Drechsler. 8vo. Pamph. Dresden, 1863. *From the Author.*

Steenstrup, J. Japetus, Sm. Om Skjævheden hos Flynderne og navnlig om Vandringen af det övre Öie fra Blindsiden til Öiesiden tvers igjennem Horedet, m. m. 8vo. Pamph. Kjöbenhavn, 1864. *From the Author.*

A Synopsis of the North American Gaurineæ. By Joseph Trimble Rothrock, B. S. 8vo. Pamph. Boston, 1864. *From the Author.*

Annual Meteorological Synopsis for the year 1864. Observations taken by J. B. Trembley, M. D. fol. Pamph. Toledo, Ohio. *From the Author.*

Kritisk Öfversigt af Finlands Fisk-Fauna. Af Anders Johan Malmgren. 8vo. Pamph. Helsingfors, 1863. *From the Author.*

Account of some new or little known species of Fossils from Rocks of the Age of the Niagara Group. By James Hall. 8vo. Pamph. Albany, 1864. *From the Author.*

Embryology of the Star-fish. By Alexander Agassiz. 4to. Cambridge, Mass., 1864. *From the Author.*

On the Hymenoptera of Cuba. By E. T. Cresson. 8vo. Philadelphia, 1865. *From the Author.*

Description of certain species of Diurnal Lepidoptera, found within the limits of the United States and British America. No. 4. By Wm. H. Edwards. 8vo. Pamph. Philadelphia, 1864. *From the Author.*

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Mémoires de la Société Impériale des Sciences Naturelles de Cherbourg. Tome x. 8vo. Paris, 1864.

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Smithsonian Miscellaneous Collections. Review of American Birds in the Museum of the Smithsonian Institution. By S. F. Baird. Part I. North and Middle America. 8vo. Pamph. Washington, 1864. Monographs of the Diptera of North America. By H. Loew. Edited by R. Osten Sacken. 8vo. Washington, 1864.

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The Races of the Old World. By Charles L. Brace. 8vo. New York, 1864.

Queens of Song. By Ellen Creathorne Clayton. 8vo. New York, 1865.

Climatology of the United States. By Lorin Blodgett. 8vo. Philadelphia, 1857.

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Savage Africa. By W. Winwood Reade. 8vo. New York, 1864.

Introduction to the Study of International Law. By Theodore D. Woolsey. 8vo. New York, 1864.

Religion and Chemistry. By Josiah P. Cooke, Jr. 8vo. New York, 1864.

Elements of Chemistry. By William Allen Miller, M. D. 8vo. New York, 1864.

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A Supplement to Ure's Dictionary of Arts, Manufactures and Mines. Edited by Robert Hunt. 8vo. New York, 1864.

Death's Doings. Illustrations of thirty Copper Plates, designed and etched by R. Dagley. 8vo. Boston, 1828.

Evidence as to Man's Place in Nature. By Thomas Huxley, F. R. S. 8vo. New York, 1863. *Deposited by the Republican Institution.*

May 17, 1865.

The President in the chair.

Fifteen members present.

The following paper was read :

Observations on the genus Belemnocrinus. By Charles A. White, M. D.

Examinations of more perfect specimens of the only yet discovered species of *Belemnocrinus*, which came into my hands after I had published a description and formula of that genus in the Proceedings of the Boston Society of Natural History, have convinced me that I had inadvertently committed an error in designating the position of the first anal plate. The diagram and description of the genus referred to are to be found on pages thirteen and fourteen of volume nine of the Proceedings, for which I here substitute the following formula:

Genus Belemnocrinus, White.

Generic formula.

Basal pieces, 5 ; short.

Subradial pieces, 5; long, narrow, forming a more or less solid cylinder, which has however, a central perforation, and is more or less excavated at its upper end, forming part of the visceral cavity.

Radial pieces 5, more or less by 5. The first radials large, forming the greater part of the calyx; the others more or less cylindrical, forming the bases of the arms.

Anal pieces unknown.

Mr. F. W. Putnam read a letter from Dr. J. Bernard Gilpin, of Halifax, N. S., containing the description of a Trout, from the St. John River, and exhibited drawings of the fish by Dr. Gilpin. He called attention to the great confusion which exists in regard to the species of the genus *Salmo* in North America, and how much there is yet to be done before the number of species can be definitely determined. The Trout in question, he thought, was of the same species as the one found in Thompson's Pond, Norway, Maine, but to which of the many named species, if they are species, it should be referred, it was impossible to state from the present data.

Mr. Putnam called the attention of the meeting to a few observations he had recently made on the Pleuronectidæ; stating that in the young specimens of *Achirus lineatus*, pectoral fins, composed of four well developed rays, were present, and that these fins did not disappear until the fish was nearly half grown.

He had also noticed that the teeth on the jaws of *Platessa plana* were movable in fresh specimens, but that after the specimens were placed in alcohol the teeth became fixed. In *P. dentata* and *P. ferruginea* the teeth were not movable in either fresh or alcoholic specimens.

The President read a letter from Dr. Brewer of the Geological Survey of California, on the existence of plants in warm springs.

Prof. Nevil Story Maskelyne of the British Museum, and Mr. W. T. March of Spanishtown, Jamaica, were elected Corresponding Members; and Messrs. A. K. Carruthers, A. P. Wingate, Wm. H. Mendell and Wm. M. Gorham, were elected Resident Members.

On motion of Dr. J. C. White, the Report of the Custodian at the previous meeting was accepted, and on motion of Mr. C. K. Dillaway, it was voted that it be printed under the direction of the Publishing Committee.

The storm preventing the presence of some members of the Committee appointed at the last meeting upon the change in the By-Laws, action upon them was postponed.

June 7, 1865.

The President in the chair.

Eighteen members present.

The Secretary announced a number of valuable donations since the last meeting, some of which were upon the table. The more important of them were a collection of corals from the Essex Institute, and a box of fossils from various parts of the United States, about four hundred in number, labelled by Mr. F. B. Meek, and presented by the Smithsonian Institution; another collection of fossils, a type series of those collected on the upper Missouri, by Dr. Hayden and Lieut. Warren, also presented by the Smithsonian Institution; and a magnificent cast of the *Schistopleurum typus*, or great fossil armadillo, of South America, from Martin Brimmer, Esq., which had already been mounted in our large hall, and forms an interesting and conspicuous feature of the Palæontological department.

The thanks of the Society were voted for this valuable donation.

The Librarian called attention to the large collection of books on the table, too numerous to specify, added to the Library since the Annual Meeting.

Dr. Pickering offered some desultory remarks upon the corals presented by the Essex Institute, and especially on the Fungians.

June 21, 1865.

The President in the chair.

Eleven members present.

Capt. N. E. Atwood made some brief statements of the habits of the Halibut, especially in distinction from the Cod.

It is found during all seasons, though it does not enjoy so wide a geographical range as the Cod, not extending so far southward, and seldom fished for below Nantucket Shoals; it is found mostly on banks, and during the month of July probably deposits its spawn in rocky localities. At first it was only sought for off our coast, but as the demand for it increased, the fishermen went to George's Bank, but the fish found there proved to be poor when compared with those found nearer to us, and after the fishery became more extensive, they became more and more scarce, so that the fisheries have extended as far as Cape Sable, and the fish themselves which were caught are smaller in size, and do not find so ready a market. Those found along our coast are still the best. There is a great disproportion in the number of individuals belonging to the two sexes, there being at least nine females to a single male. The males can be readily distinguished by being in poor condition. Captain Atwood had caught but a single male that was fat, which weighed over sixty pounds. The average full grown female generally weighs from one hundred to one hundred and fifty pounds. The largest Captain Atwood had ever taken, weighed, when dressed, two hundred and thirty-seven pounds, and would probably have weighed three hundred pounds as taken from the water. Halibut are generally caught after sunrise, and then seize the bait used for fishing for Cod, so as to drive them away, and continue to bite during the day, while Cod are generally caught mostly by night. The Halibut will devour almost any fresh bait, though it will not touch clams or squid, which are good bait for Cod. There is not enough fat in Halibut to pay for the extraction of the oil.

The Corresponding Secretary read the following list of letters: —

From the Royal Horticultural Society, London; the Pollichia, Neustadt, the Société des Sciences Naturelles, Luxembourg; and the Natural History and Philosophical Society of Belfast, February 4th, 1865; the Royal Society of Edinburgh, March 11th, 1865; the Smithsonian Institution, March 27th, and June 7th, 1865; the K. B. Akademie der Wissenschaften, and the K. Hof- und Staats-Bibliothek, München; the K. K. Geologische Reichsanstalt, Wien, March 27th, 1865; the Société Impériale Géographique de Russie, St. Pétersbourg, and the Royal Society of London, March 29th, 1865; the Société de Géographie, Paris; the American Philosophical Society, Philadelphia; and the Société d'Agriculture, etc., de la Sarthe, Le Mans, April 14th, 1865; the Königliche Gesellschaft der Wissenschaften zu Göttingen; and the Royal Geological Society of Ireland, May 1st, 1865; Bowdoin College, Brunswick, Me., May 31st, 1865; the Deutsche geologische Gesellschaft, Berlin; the Naturforschende Gesellschaft, Danzig; the Naturhistorischer Verein in Augsburg; the Lyceum of Natural History of New York; the Société Impériale des Naturalistes de Moscou;

and the Naturwissenschaftlicher Verein des Harzes, Blankenburg, June 7th, 1865; the Literary and Historical Society of Quebec, June 15th, 1865, acknowledging the receipt of the Society's publications; the K. Akademie der Wissenschaften, Wien, February 4th and June 2d, 1865; the Naturforschende Gesellschaft des Osterlandes, zu Altenburg, February 4th, 1865; the Journal of Entomology, London; and the Verein für vaterländische Naturkunde in Würtemberg, March 17th, 1865; the Zoologische Gesellschaft zu Frankfurt am Main, March 27th, 1865; the Société Linnéenne de Bordeaux, and M. Ch. des Moulins, April 14th, 1865; the Museum Francisco-Carolinum, Linz; and the Naturforschende Gesellschaft, Basel, May 1st, 1865; the K. K. Central Anstalt für Meteorologie und Erdmagnetismus, Wien, June 2d, 1865; the Ferdinandeum, Innsbruck; the Natursforschende Gesellschaft zu Görlitz; and the Société de Physique et d'Histoire Naturelle de Genève, June 7th, 1865, acknowledging the same and presenting their own publications; the Kongl. Svenska Vetenskaps Akademien, Stockholm; and the Naturforschende Gesellschaft, Freiburg, February 4th, 1865; the Geological Survey of India; the Royal Geographical Society, London; and the Bureau de la Recherche géologique de la Suède, March 13th, 1865; the Naturforschende Verein zu Riga, April 14th, 1865; and the K. P. Akademie der Wissenschaften, Berlin, April 14th, and June 7th, 1865, presenting their publications; the Natural History Society of Montreal, June 16th, 1865, presenting their publications and asking for back numbers of the Society's; from Baron von Osten Sacken, March 23d, 1865, presenting the publications of the Entomological Society of St. Petersburgh; and from Mr. Samuel Hubbard, San Francisco, Cal., March 17th, Prof. P. A. Chadbourne, Williamstown, Mass., March 21st, and Prof. A. E. Verrill, New Haven, Ct., April 12th, 1865, acknowledging their election as Corresponding Members.

July 5, 1865.

The President in the chair.

Twenty-one members present.

Dr. J. B. S. Jackson exhibited a series of photographs (forty-seven in number) of Indians of different tribes, sexes and ages, intended to illustrate ethnological differences.

Dr. A. A. Gould presented, by title, a paper on "The Nudibranchiate Mollusks of New England."

Dr. C. F. Winslow read some notes on microscopic marine animals found floating on the sea off the northern Lobos Island, Lat. 6° 30′ S., Long. 83° 15′ W., on the morning of March 15th, 1864. They covered the surface of the sea with a grayish scum like dirty oil, which under the microscope appeared gelatinous, translucent, or rather transparent, less than .01 inch in diameter and very uniform in size. Other forms found with them were also described by Dr. Winslow.

The Corresponding Secretary read a letter from the Natural History Society of Montreal.

The special business of the evening, consisting of the question of adoption of proposed amendments to the By-Laws, being called up; it was voted, on motion of Dr. White, that in the question of their adoption they be considered separately, and the several amendments as proposed were adopted as follows:

Section II. *Article* 5. The first clause, which now reads: "The Treasurer shall have charge of all money and other property of the Society, except the Building, Library and Museum," to be altered so as to read, "The Treasurer shall have charge of all money and other property of the Society, excepting the Building on Berkeley Street and its contents, and excepting also such property as may be placed by the Council in the hands of Trustees."

Sec. II., *Art.* 9, which now reads: "The Council shall control all expenditure of money, and make rules for the use of the Library and Museum, and special rules for the direction of the Librarian and Custodian. It shall elect annually a committee of five members to be called the Publishing Committee, and a committee of three members to be called the Finance Committee. The Council shall have free power to act for the interests of the Society, in any way, not inconsistent with the Constitution and By-Laws," to be altered by omitting the word "and" after "money," substituting the word "and" for "It," after "Custodian" and omitting the words "and a committee of three members to be called the Finance Committee."

An additional article to be appended to this section, as follows: "*Art.* 10. The Council shall annually appoint three Trustees, one of whom shall be the Treasurer *ex-officio*, to whose charge shall be entrusted all the funded property of the Society, with power to sell and re-invest according to their judgment."

SEC. VI., *Art.* 2, to be struck out, and the following substituted in its place : "The Council shall, previously to every annual meeting, appoint a committee whose duty it shall be to audit the accounts of receipts and expenditures of the Corporation."

September 20, 1865.

The President in the chair.

Thirty members present.

Prof. Wyman, in noticing a fine exhibition of ripple marks on strata of the Potsdam sandstone in Keeseville, N. Y., made some observations on similar marks which he had seen made.

Those of the Potsdam sandstone were distinct and fresh as those recently made. He had noticed on the border of the lake in the neighborhood, the recent ones made on a sandy beach, when the wind ruffled the surface of the water. They were three inches wide, while the waves above them measured three feet from crest to crest. During a calm they flattened down and gradually disappeared. They were parallel to the shore, and forced on by the waves advanced toward it, travelling the distance of three inches in half an hour. Indications of such changes in position could also be plainly seen on the Potsdam sandstone. There were sometimes transverse marks, occurring at breaks in the course of those lying parallel to the shore, occasioned by cross waves. Such were also indicated in the Potsdam sandstone.

In form, the ripple marks seen in the lake were steep on the shore side, but presented a longer slope towards the water side; thus one could distinguish the shore from the water side in the Potsdam sandstone; sometimes, however, the sides were equal.

The Corresponding Secretary read the following list of letters: —

From the Albany Institute, June 7th, 1865; the Naturhistorischer Verein der preussischen Rheinlande und Westphalens, and the Mittelrheinischer geologischer Verein, Darmstadt, August 24th, 1865; the India Museum, and the Literary and Historical Society of Quebec, September 16th, 1865, acknowledging the receipt of the Society's publications; the Real Academia de Ciencias, Madrid, July 13th, and August 24th, 1865, acknowledging the same and presenting their own publications; the Naturhistorische Gesellschaft zu Hannover, July 15th, 1865; the Museo publico de Buenos Aires, the Société Imperiale de Géographie à St. Pétersbourg, the Société Linneénne de Lyon, the R. Istituto Tecnico di Palermo, August 24th, 1865, presenting their publications.

The following paper was read:

Notes upon some Odonata from the Isle of Pines. By Samuel H. Scudder.

The Isle of Pines, where the insects were obtained, which form the basis of the following notes, is, zoölogically speaking, a portion of Cuba, though differing from it, or at least from those portions of it with which it is in geographical contiguity, by very marked physical features. I believe that a few insects have been found there, which have not yet been discovered in Cuba, but probably a more careful search will bring them to light. The island is about twenty-five miles in diameter, its nearest point fifty miles distant from Cuba, (a distance broken moreover by a series of keys stretching in a northwestwardly direction) and is in the longitude and jurisdiction of Havana. The climate is milder, but much more equable than that of the contiguous parts of Cuba.

The Odonata mentioned in the following pages were obtained at Sante Fé, on May 10th and 13th, with the exception of one or two which were taken in Cuba at an earlier date, but which became mingled in my collection, so that I was not able to distinguish them; the notes have reference particularly to the colors of the living insects. I am indebted to Mr. P. R. Uhler for some valuable hints upon the generic relations of some of the species mentioned.

Agrion Maria *nov. sp.*

♀ Head, light blue; the vertex, behind the front ocellus, black, enclosing a transverse, light band of irregular border, which fails to reach the border of the eyes or of the ocelli, and is constricted in the middle so as to be nearly resolved into two wedge-shaped spots in reversed positions; antennæ dusky, the anterior half of first joint and basal half of the second pale bluish; prothorax light blue, a dorsal line, a lateral stripe, and a sublateral apical spot, black; posterior edge triangularly produced, the apex rounded; thorax light blue, the dorsum with a serrated median stripe and a humeral stripe, cleft from the humerus for more than half its length, black; pleura with a narrow anterior abbreviated black stripe, thickened at the tip, not more than one-third or one-fourth the length of the pleura, approximated and parallel to the humeral stripe and sometimes connected with its posterior fork at the apex of the same; also a narrow median black stripe parallel to the others, triangularly dilated posteriorly at the base, starting from the base of the posterior wings at the anterior border and failing to reach the mesothoracic stigma, beneath which in assumed continuation of this stripe is a small black spot; wings hyaline, apical third indistinctly luteous; pterostigma small, rhomboidal, dark reddish brown; legs pale with black spines, the femora with a superior blackish-brown vitta, extended on to the anterior surface at the apex; tibiæ with an inferior fuscous vitta obsolescent towards the apex; abdomen bronze-black, segments 1–2 with a broad lateral stripe, one with a dorsal central spot, two with a median spot in the form of an (!), 3–7 with a narrow basal annulus, and a narrow lateral stripe pale light blue, that of segments 1–2 more distinct; segment eight, with a very narrow basal annulus and the inferior surface pale blue; nine, pale blue with a linear basal annulus, a narrow apical annulus expanded triangularly on the middle of the dorsum, and a dot on either side of the expansion, black; ten, pale blue above, black beneath, posterior margin entire; appendages black, very short; superior pair trigonal, laminate, channelled inferiorly and so minutely bifid at the tip, which is directed posteriorly upwards and slightly outwards, with a tubercle upon the middle superiorly; inferior pair sub-cylindrical, simple, twice as long as broad, subcultriform, obtusely carinate beneath; eleven postcubitals.

Length, 1.38 inches; alar expanse, 1.44 inches. 4 ♀.

During life the colors of the body are black with a metallic lustre on head and thorax as well as abdomen, and light blue, very pale on the abdominal segments, except 1–2.

It seems to be closely allied to A. exsulans Hagen.

? Agrion (Ischnura) cœcum Hagen.

Some of my specimens seem to agree pretty well with Hagen's description of this species, but yet differ so much that I deem it best to describe them throughout.

The colors of the ♀ in life were not noted by me; those of the ♂ were a bronze-green with metallic reflections, and a deep bluish purple; in the teneral stage the green was dull, and the purple very pale; in the following description I give the colors as they now appear.

Head black, the front brownish-black, labrum dark testaceous (adult ♂), or luteous with a vertical transverse band of bronze-green extending forward to the base of the antennæ, and in the middle of which the ocelli are situated (teneral); antennæ blackish-brown, basal joint reddish-brown (adult ♂), or luteous (teneral), joints two and three tipped with reddish-brown (♂) or two luteous, three fuscous, basal half luteous (teneral ♀); dorsum of prothorax bronze-green, sides bluish purple (adult ♂), or sides pale purplish (teneral ♂), or pale testaceous (teneral ♀); posterior edge uniformly raised (♂), or entire and simple (♀); thorax deep bluish purple (adult ♂), or pale purplish-brown (teneral ♂), or pale testaceous (teneral ♀), with a broad straight median dorsal stripe, a broad straight humeral stripe, largely clubbed at the apex, and a narrow metathoracic, sometimes abbreviated, stripe, bronze-green, the humeral stripe in teneral ♀ only dark testaceous; wings hyaline; pterostigma small, rhomboidal, rosy-brown (adult ♂) or pale (teneral); legs blackish-fuscous with black spines, those of tibiæ very long, the coxæ, the femora at base, their posterior and inferior surfaces, and tibiæ except anterior surface, reddish-brown, claws reddish, black-tipped (adult ♂), or pale, the anterior edge of superior surface of femora and tibiæ and a basal annulus on the tarsi blackish-fuscous (teneral); abdominal segments 1–3 bright blue, the base of 1, sides of 2 and a dorsal transverse band just beyond the middle of the segment, its posterior edge excised, apical fourth of 3 bronze-green, 4–7 and 10 bronze-green, 8–9 bright blue (♂, in the teneral ♀ the blue is faint), or, bronze greenish-brown, deepest on segments 1–2, 7–9, the sides wholly, and on segments 3–7 a basal annulus pale testaceous (teneral ♀, of which the terminal segment is destroyed); posterior edge of 10 in ♂ strongly excised; superior appendages of ♂ black, forcipated, as long as the side of the terminal segment, sub-incurved, interiorly subunguiculated at tip, a tooth which is sometimes indistinctly bifid on the interior edge at one-third the distance from the tip, basal half suddenly produced at the inferior inner angle to a broad rounded testaceous lamina; inferior appendages luteous, very short, broad, the outer upper angle furnished with a sharp, subincurved and sharply upturned, black-tipped unguiculus; appendages of eighth segment of ♀ broadly ensiform, minutely denticulate beneath, superior half pale testaceous, inferior half blackish fuscous, with apical acicular divaricating appendages nearly .01 inch in length; 9–11 postcubitals.

Length, 1.25 inches; alar expanse, 1.26 – 1.48 inches (♂), 1.20 inches (♀). 3 ♂, 2 teneral ♂, 1 teneral ♀.

Æschna virens Ramb.

I have two males from the Isle of Pines, which apparently belong to this species as described by Hagen; all the green markings of variable brilliancy in the dried insect were of a similarly bright grass-green in the living insect, and all the darker markings, except the fuscous sutures of the thoracic pleura were black. The inferior abdominal appendage appears to differ from Hagen's description in being more than half as long as the upper, and in being docked at the tip; the auricles of the second abdominal segment are smaller than usual, and there is a mass of nigro-cinereous, delicate, close pile on the dorsum of the first and second abdominal segments, in the latter only at the base; the posterior half of the wings are very slightly washed with fuscous; antecubitals 18–21; postcubitals 11–12.

Length 2.90 – 3.16 inches; alar expanse 4.15 – 4.44 inches; pterostigma, .20 inches. 2 ♂.

Macromia cubensis *nov. sp.*

Vertex and front above purplish (in life steel-blue) with metallic reflections; front dull yellowish-brown (as in life); labrum reddish-brown, edged with black (as in life); dorsum of thorax purplish (steel-blue with greenish reflections, more or less dulled in life); pleura fuscous (in life brownish-yellow) with three dull-purplish stripes (metallic blue in life), the middle one narrower and shorter than the others; legs black, next the base within, especially in the hind pair, yellowish; wings hyaline, the posterior pair fulvous at the extreme base; pterostigma greyish-fuscous; membranule nigro-cinereous; abdomen bronze-green with metallic reflections (as in life) with a band along the sides, broader next the base, linear beyond the fourth segment, but extending the whole length of the abdomen, fuscous (in life brownish-yellow); appendage black, very short; vulvar lamina triangularly produced, excised at the apex, so as to make it bifid, the segment following it carinated; tip of abdomen furnished with short cinereous hairs; antecubitals 8; postcubitals 6–7; two discoidal areolets.

Length 1.44 inches; alar expanse 2.44–2.48 inches; pterostigma .10 inch. 3 ♀.

Tramea insularis Hagen.

I have taken but a single female of this species, which, though Hagen refers to no such distinction, differs from four males taken by me in having the front above of the same color as the rest of the face, and the vertex a darker tinge of the same color instead of being brassy purple; also in that the fuscous band at the base of the posterior wings is narrower and reaches neither the posterior border, nor the anal angle toward which it turns.

This ♀ when alive had the front and vertex light brownish yellow, the labrum, except the black apex, as well as the other mouth-parts, reddish-brown; thorax very pale olivaceous-green; spots on the last three segments of abdomen black, the dorsum of the segment anterior to them dull orange; the other segments above reddish-orange; sides of abdomen dull olivaceous-green, beneath plumbeous.

I do not think this can be the ♀ of *T. abdominalis;* the pterostigma is fulvous; the specimens were all taken at the same time, and the ♂♂ are unmistakably *T. insularis.* Selys seems to have had specimens of both before him in preparing his description.

I do not find that Hagen makes any reference in his Synopsis to the species referred to by Selys under the name of *L. cophysa* Kollar MS., which belongs to this group, has been found in Cuba, and appears never to have been described: is it this species?

Antecubitals, 11; postcubitals, 8–9. Length, 1.84 inches; alar expanse, 3.32 inches; pterostigma, .11 inch.

Libellula auripennis Burm.

I have several specimens from the Isle of Pines which agree with Hagen's description of this species; the wings, however, can hardly be said to have their anterior margin flavescent, as the flavescence is almost entirely confined to the two principal veins at this point, slightly suffusing the membrane at the nodus and towards the base; the slight infuscation of the apex is a little flavescent also.

During life the natural colors of the teneral stage (♂ and ♀) are as follows: The face is pale brownish-yellow, dorsum of thorax yellowish-brown (I made no note of the median sulcus); pleura the same as the face with a tinge of green, the abbreviated stripe yellowish-brown; abdomen dusky lemon-yellow, the median stripe black posteriorly, brown anteriorly; beneath the same as the pleura.

Antecubitals, 15–17; postcubitals, 11–13. Alar expanse, 2.92–3.10 inches. 5♂, 1♀. It was one of the most common species

Libellula angustipennis Ramb.

One teneral female taken by me seems to agree with the descriptions by Selys and Hagen, although my specimen is somewhat smaller.

When living, this teneral ♀ showed the vertex of the head next the eyes very dark reddish-brown; the rest of the vertex and the upper part of the face steel-blue with metallic reflections, below lemon-yellow; the dorsum of the thorax dark yellowish-brown, the pleura steel-blue, both with some metallic reflections, and their stripes (which on the dorsum are a median and humeral line, and on the pleura are two lines and two stripes alternately disposed, the stripes (posterior) lemon-yellow; abdomen of a lighter yellowish-brown than the dorsum of the thorax, the basal streaks lemon-yellow, and the edges black.

Antecubitals, 14–15; postcubitals, 8–9. Expanse of wings, 2.4 inches; pterostigma, .13 inches. 1 teneral ♀.

Libellula vinosa *nov. sp.*

Front reddish-brown, paler in the middle (the labrum sometimes edged with black), or dull olivaceous-yellow (in life deep blood-red); dorsum of thorax fuscous (in life olivaceous-red) obscurely banded before the humerus with dull yellowish (in life only a lighter tint of the basal color) or with a median line and two narrow (the anterior sometimes broad) humeral stripes, bent abruptly, without widening, at the humerus, and just failing to reach the middle line, yellow; pleura fuscous, sometimes with slight steel-blue reflections (in life dark olivaceous-brown with dark greenish reflections) with four yellow or ochraceous stripes (in life blood-red*); the anterior irregular, indistinct close to the humeral stripe; the second in the middle, broad and straight, the fourth as broad as the second, bordering the hinder edge of the pleura, the third between them insignificant and irregular; wings hyaline with vinous veins, subinfuscated at tip, the anterior pair flavescent from the base to about one-third the distance to the triangle; posterior pair fusco-flavescent at the base as far as the triangle, with two blackish streaks in the spot, between the second and third and the fourth and fifth principal veins, which are also indistinctly seen on the anterior wings; pterostigma nigro- (teneral) or rubro-fuscous; membranule blackish; legs black, base of femora, inside of fore and sometimes middle femora luteous; abdomen reddish-brown (in life blood-red or yellowish-brown, teneral); the incisures, segments 1–4 and 8–9

* This deep and brilliant color in this and other parts is mentioned in my notes only with reference to the darker colored and banded individuals; I can hardly believe that those which have the bands distinctly and rather fresh yellow at present, could have had them blood-red during life; it does not appear to have any teneral signification.

and sometimes those between with a lateral stripe, black; appendages reddish-brown (♂), or yellowish-brown (teneral ♂), tipped with black (♂), or fuscous (teneral ♂); or basal half yellowish-brown, apical half black (teneral ♀); antecubitals, 15–17; postcubitals, 9–11; three rows of discoidal areolets.

Length, 1.42 inches; alar expanse, 2.24–2.48 inches; pterostigma, .10 inch. Adult ♂, 2; teneral (♂, 3; ♀ 1).

Dythemis frontalis (Burm.) Hagen.

Hagen has added very little to the previous descriptions of this species by Burmeister and Selys, and evidently had before him only the specimens of these authors, neither of whom mention the ♀, which differs considerably from the ♂, at least in wanting the pruinosity of that sex, and in the size of the expanded terminal abdominal segments.

♀. The face in front is pale brownish-yellow (in life pale greenish-yellow); above and on the vertex, but not on the sides, greenish-chalybeous (in life bronze-black with purplish reflections); labrum black; behind the eyes yellow, broken by transverse fuscous lines; thorax fuscous (in life dark fuscous) with an humeral streak, angulated on the inside at the base of the wings, and three pleural stripes dull yellow (in life lemon-yellow); not only the anterior but also the middle femora pale inside (in life yellow), and not only inside but posteriorly and at the base altogether; wings hyaline, the extreme base of the posterior pair, next the principal veins fulvous; a spot on the anterior half of the apex of the wings, in the middle of which the pterostigma stands, barely tinged with luteous; the membranule mentioned by Selys as fuscous and by Hagen as black, is dark fuscous; the width of the swollen base of the abdomen is to that of the expanded portion, extending from the middle of the sixth segment to the ninth (inclusive) as four to five; abdomen black (so in life), the sides with an upper and lower longitudinal irregular streak of brownish-yellow (in life lemon-yellow) most conspicuous on segments 1–3, only present as a line on the basal half of segments 5–6, as outer and inner spots or streaks on basal half of 7–8, more conspicuous on 8, and wanting on 9; antecubitals 14; postcubitals 10;

Length 1.84 inches; alar expanse 3.20 inches; pterostigma .10 inch.

The ♂ differs from the ♀ in the following particulars: — the thorax is bluish pruinose (as in life) with the markings like the ♀ faintly discernible; only the anterior femora pale inside and at the base, though the middle femora have those parts fuscous rather than black; the posterior pair of wings do not have the base so much tinged with fumose, if at all, and the luteous spot at the apex of all the wings nearly if not quite reaches the posterior edge, but extends no nearer the apex than the middle of the pterostigma, starting from half way between the nodus and pterostigma; the abdomen (in life) has the segments 4–6 black, the others blue pruinose; the pruinosity remains in one specimen before me, in another it is seen only on segments 1–3, and on the others none at all; the abdominal markings of the ♀ are altogether wanting; the width of the swollen base is to that of the posterior half of segment sixth to the ninth segment as four to six; antecubitals 15–16; postcubitals 9–11.

Length 1.75–1.78 inches; alar expanse 3.04 inches. 3 ♂, 1 ♀.

Dythemis pleurosticta (Burm.) Hagen.

I consider as belonging to this species six specimens obtained by me, all but one of which are teneral; I could not, however, have considered them identical with Burmeister's *L. pleurosticta* from Brazil, had not Dr. Hagen compared his types with specimens from Cuba; the expression "*thoracis dorso trilineato*" would not have been applied to specimens the dorsum of whose thorax was figured with a rather broad humeral streak, very broad and angulated at the humerus, and with the barest possible indication, when any, of a median line; in other respects my specimens agree with the descriptions of Burmeister, Selys and Hagen, except that the membranule should rather be described as whitish-cinereous (those of the teneral stage almost milk-white), that the pleural spots of the thorax are pale bluish-white (in the teneral stage milk-white), and that the apex of the primaries beyond the nodus in the teneral ♀ is fumose, faintly fenestrated with fuscous.

In the living specimens the vertex of the head is bronze-black with purplish reflections, but next the eyes, as in dried specimens, reddish-brown; the upper part of the face is very pale bluish-white, below dull reddish-brown, passing to the upper part of the labrum, and including the apical half of the labium; the thorax is testaceous marked with black, the spots bluish white (or in teneral specimens milk-white); there is a minute yellowish spot on black ground on the pleura, just above the hind coxæ; abdomen pitchy-black, marked with bluish-white (or in teneral specimens milk-white, a little dull).

Antecubitals 13–15; postcubitals 8–10; alar expanse 2.5–2.64 inches. 1 ♂, 1 teneral ♂, 4 teneral ♀.

Mesothemis Poeyi *nov. sp.*

Vertex and upper portion of front, except at the sides, chalybeous (in life bronze-black with deep purplish reflections); face and mouth pale yellow (in life pale greenish-yellow); back of the head between the eyes, and a spot on either side in the middle, yellow; two spots on the middle of the dorsum of prothorax and its posterior lobe yellow; dorsum of thorax as far as the middle of anterior wings reddish-black with purplish reflections (in life dark greenish-brown) striped with bright lemon-yellow (as in life) as follows:—a middle line expanded anteriorly, a straight antehumeral narrow stripe on either side, slightly divaricating anteriorly, thickened posteriorly, bent downwards and blurred anteriorly, a narrow humeral stripe, shaped like a brace, the central angle directed backwards, also the humerus and a minute antehumeral transverse spot yellow; pleura of thorax bright lemon-yellow (as in life) with two approximate central stripes, nearly or quite straight of purplish-black (in life dark greenish-brown); legs black, interior of fore femora luteous; wings hyaline, an indication of fulvescence at the extreme base, especially of posterior pair; pterostigma fuscous; membranule black; abdomen pitchy black (as in life); a broad lateral stripe extending from base of abdomen to middle of fourth segment, an abbreviated lateral stripe on segment 5, the base of segments 5 and 6 narrowly, and a large spot at base of 7 not reaching the lateral edge but extending over more than half of the segment, excised in the middle posteriorly and divided by a median black line, yellow (in life bright lemon-yellow); terminal segment with four indistinct yellow dots; appendages black; genital lobes bent towards and touching one another, broader and truncate at tip, black; anterior branch of genital hamules short, simple, conical, testaceous; posterior branch testaceous, narrowed in the middle, directed strongly backwards, the basal halves divaricate, apical halves approximate and touching at tip, which are broad, denticulate and black, at the base interiorly and posteriorly a minute reddish unguiculus directed backwards, their tips divaricate; 10–11 antecubitals; 7–8 postcubitals; three rows of discoidal areolets, then two, then three again.

Length 1.6 inches; alar expanse 2.52 inches; pterostigma .12 inch. 1 ♂.

Mesothemis Gundlachii *nov. sp.*

♂. Vertex and front dull green, the upper part of the face a little infuscated (in life grass-green); vertex bi-tuberculated; mouth luteous (in life lemon-yellow); thorax, both dorsum and pleura, dull, slightly olivaceous-green (in life grass-green), the incisures reddish-brown; humerus edged with black; legs black, base of all the femora and the inside of fore femora pale; wings hyaline with black veins; pterostigma luteo-flavescent; membranule black; abdomen black marked with brownish-yellow (in life grass-green); segments 1–3 brownish-yellow with black incisures, the third with a subdorsal band of black on the apical half of either side, united at the apex; 4 black, broadly brownish-yellow at base, with an abbreviated lateral stripe of brownish-yellow beyond; 5–8 black with a saddle-shaped brownish-yellow spot anteriorly; 9–10 black; upper appendages clear yellow, lower ones tinged with fuscous; abdomen beneath pruinose; genital hamule testaceous, inner branch black, within cylindrical, unguiculated, outer branch laminate rounded, but slightly docked at the tip, extending half way to apex of genital lobe; genital lobe oval, black, hairy; 12–13 antecubitals; 10 postcubitals; three rows of discoidal areolets.

Length 1.66 inches; alar expanse 2.48 inches; pterostigma .125 inch. 1 ♂.

Diplax ochracea (Burm.) Hagen.

♀. Vertex and upper part of front fuscous (in life pale reddish-brown with a greenish tinge), or dull luteous (teneral); face yellowish-brown (in life pale green) or pale (teneral); labrum edged with reddish-brown; dorsum of thorax brown mottled with dull yellow (in life dull green), or yellow marked with brown (teneral); pleura of thorax dull greenish-yellow, paler below, the sutures brown with a dark reddish-brown spot at the base of the anterior and middle legs (in life dull green with dark reddish-brown markings), or pale lemon-yellow with fuscous markings (teneral); legs black, fore femora, except the outside, the other femora towards their base, pale luteous; wings hyaline, veins black, subinfuscated at the extreme tip, the base flavescent as far as half way to the triangle or less on the anterior wings, and to the triangle on posterior pair; on one specimen it is almost wanting on the anterior wings and on the posterior wings extends only as far as is usual on the anterior pair; pterostigma fuscous, the bordering nervures very black, in teneral stage paler; membranule black; abdominal segments 1–3 testaceous bordered posteriorly with fuscous (in life dull greenish-yellow bordered with very dark brown), or pale lemon-yellow bordered with brownish-fuscous (teneral); remaining segments blackish brown, each side of segments 4–7 with a broad brownish-yellow band directed backwards and upwards, nearly meeting one another posteriorly (colors of the living specimens like the base of the abdomen), or in teneral stage the same, with the colors pale yellow and brownish-black; terminal segment and appendages fuscous or pale yellowish (teneral); 10–11 antecubitals; 7–8 postcubitals; three rows of discoidal areolets, then two, then three again.

Length 1.30–1.34 inches; alar expanse 2.20–2.26 inches; pterostigma .13 inch. 4 ♀, 3 teneral ♀.

The posterior lobe of the prothorax is large and quadrangular, hardly bifid.

Hagen in his synopsis gives "Libellula justiniana Selys" as a synonym, evidently through inadvertence, "Libellula justina Selys" being intended, as is evident from the description, as well as from his giving "Libellula justiniana Selys" as a synonym to his Diplax justiniana immediately below; in one the vulvar lamina is erect, in the other suberect.

Diplax justiniana (Selys) Hagen.

I have specimens which agree altogether with Hagen's careful description of this species, with the following exceptions: The appendages of the adult ♂ are brownish-black, being rufo-fuscous, as described by Selys, in the teneral stage; the pterostigma is pale fuscous in both stages and sexes, instead of yellow as described by both Selys and Hagen; the membranule is nigro-cinereous, edged with black, in the adult ♂.

The colors of the living specimens are as follows: — Vertex of head and upper part of face bronze-black with purplish reflections (adult ♂) or dusky greenish-yellow (teneral ♂) or lemon-yellow (teneral ♀); middle of face very dark brown (adult ♂), or dusky greenish-yellow (teneral ♂), or lemon-yellow (teneral ♀); labrum reddish-brown (adult ♂), or testaceous (teneral ♂) or lemon-yellow (teneral ♀); dorsum of thorax velvety-black (adult ♂) or reddish-brown, pale along the middle (teneral ♂) or yellowish-brown with a lemon-yellow median band (teneral ♀); pleura of thorax dark dull olivaceous-green (adult ♂), or dark dull green (teneral ♂) or lemon-yellow (teneral ♀); abdomen black pruinose, some of the terminal segments — the particular ones not noted at the time of description, and not indicated on the dried specimens — very dark bronze-green (adult ♂), or black pruinose, marked with reddish-brown mixed with black (teneral ♂), or yellowish brown marked with black (teneral ♀).

Antecubitals 8–9; postcubitals 6–7; length 1.04 – 1.16 inches; alar expanse 1.64 – 1.88 inches.

1 adult ♂, 2 teneral ♂, 1 teneral ♀.

Diplax abjecta (Ramb.) Hagen.

To this species must, I suppose, be referred four male specimens which I captured in the Isle of Pines, although the basal spot of the wings is altogether absent, the pterostigma is almost fuscous and measures scarcely more than three millimetres in specimens whose expanse of wing is 56 millimetres; the base of the legs are reddish-brown.

In life the vertex and front above are bright steel-blue; the face below pitchy-black; the dorsum of the thorax velvety-black; the pleura very dark olivaceous-brown, above the base of femora reddish-brown; abdominal segments 1–3 very dark reddish-brown mixed with black, segments 4–6 and all of 7 except apex, black pruinose, the remainder velvety-black with occasional reflections of a very dark bluish tinge; 10–11 antecubitals; 7–9 postcubitals.

4 ♂.

Perithemis Domitia (Drury) Hagen.

In living specimens the lighter colors of the face are olive-green, the darker reddish-brown with an olivaceous tint; the thorax is maroon-brown with an olivaceous tint, the markings — the dorsal and two pleural stripes — of olivaceous-green; the abdomen above is yellowish-brown, the markings — a divided median longitudinal stripe — of ochraceous yellow; beneath it is pale olivaceous-green; the pterostigma brilliant red.

Antecubitals 7; postcubitals 4–5; length .84 inch; alar expanse 1.48 inches.

2 ♂.

The following announcement was made by the Publishing Committee:—

Written communications presented to the Society for publication shall be under the entire control of the Publishing Committee, who shall decide from their length and character whether they shall appear in the "Memoirs" or "Proceedings"; they may make any alterations in the MS. which they may deem advisable to prepare it for the press, retaining, however, the essential meaning of the author; and shall make or cause to be made for publication in the "Proceedings" an abstract of every paper appearing in the "Memoirs." In the "Proceedings" every paper or abstract shall be published in connection with the doings of the meeting at which it was presented; but the Publishing Committee shall decide upon the consecutive arrangement of those inserted in the "Memoirs," assuming editorial privileges in this respect, in order to secure uniformity of size, variety of matter and a fair proportion of illustrations in the different numbers.

Any article requiring or improved by plates will be illustrated, provided drawings are furnished by the author; but no portion of any paper will be placed in the hands of the printer until the whole of the MS. and the accompanying drawings are in the possession of the Publishing Committee.

As soon as a paper is published in the "Memoirs," a number of extra copies, not exceeding fifty, in plain colored wrappers, will be given to the author as he may specify at the time of the presentation of the paper; any additional number, or any extras whatsoever from the "Proceedings" must be at the author's expense.

The author shall be liable for any corrections made by substitution of words or sentences, additions to or subtractions from the article after it is in type.

Mr. S. G. Webber was elected a Resident Member.

DONATIONS TO THE MUSEUM

May 3. A double-headed Kitten, Holothurian and four Crustacea, two polypes, a bird's skull, and a fish, by Dr. B. S. Shaw. Pebbles, scratched by glacial action, from Dorchester, by Mr. C. Stodder. Specimens of Cinchona Bark and Muravilla Bark, from Paita, Peru, by Dr. C. F. Winslow. Leaf of the Palm, by Miss Wales. Crystals and Starch granules, prepared for the Polariscope, by Mr. J. S. Melvin. *Melosira fragillaria*, and Rhabdonema, mounted for the microscope; Campanularia, etc., from South Boston bridge, by Mr. C. G. Bush. Fossils from Jarrett's Knob, Murfreesboro', Tenn., by Mr. W. C. Russell.

May 17. A Bat, *Artibeus achradophilus* Gosse?, from Moneague, Jamaica; Bow and Arrows from the East Indies; a bird; and *Sarcorhampus papa*, from Para, Brazil, and Insects from Panama, by Dr. H. Bryant. *Samia Cecropia* and cocoon, from Roxbury, Mass., by Miss Holliday. Five hundred and fifty-six specimens of Cretaceous and Tertiary fossils from the West, labelled by Mr. F. B. Meek, by the Smithsonian Institution. Cast of *Schistopleurum typus*, by Mr. Martin Brimmer. Five birds from near Boston, by Mr. W. C. Bradbury. *Asterias vulgaris* Stmp., from New Haven, Conn., *Asterias littoralis* Stimp., *Astrophyton Agassizii*, *Solaster endeca*, and an Asterias sp., from Eastport, Me., by Yale College.

June 7. Eight specimens of Corals, by the Essex Institute. *Corbula mactriformis* M. and H., from Fort Clark; *Cardium subquadratum* E. and S., from the Yellowstone River; *Cucullea Shumardi* M. and H., from Long Lake, Dacota Terr.; and Dione sp., from the mouth of Milk River, from the Cretaceous formation, collected by Messrs. Meek and Hayden; by the Smithsonian Institution. Æshna, from Boston, by Mr. George Coles.

June 21. Three Lepidoptera, from Hartt's Location, White Mountains, N. H., by Dr. S. A. Bemis. Bean pods of the Acacia, from Antigua, by Mr. S. Wells, Jr. Barnacles taken from a vessel after a passage, by Mr. P. E. Stearns. *Cannabis sativa*, Hasheesh, from West Africa, by H. McMurtrie. Idotæa, from Boston Harbor, by Mr. C. Stodder. *Samia Cecropia* and cocoon, from Boston, by Miss Blaikie. *Liomorpha flabellata* Smith?, Diatomaceous deposit, from Bemis Lake, White Mountains, by Dr. S. A. Bemis. *Tropæa Luna*, from Richmond, Va., by Dr. C. F. Hildreth. Collection of fossils, from the table land above Paita, Colan and Amotape, S. A.; Iron Ore, from the West Cordillera of the Andes, Lat. 5° S., Peru; by Dr. C. F. Winslow.

July 5. Bituminous Shale, from Mantigo Bay, Mexico, by Mr. Nelson. Clay, from an Artesian well from near Paita, Peru; a mass of Silicious Infusoria, from between Sachusa and the Great Salt Basin, seventy miles south of Paita, Peru; a beetle, from the Desert, twenty miles back from Paita, Peru; a serpent from the lowlands, twenty miles from Guayaquil, by Dr. C. F. Winslow.

September 20. Specimens of Idocrase, from Perry's Farm, Minot, Me., and of Tourmaline, from Hebron, Oxford Co., Me., by Mr. Luther Hills. A male *Corydalis cornutus*, from near Boston, by Rev. Mr. Eddy. A rattlesnake, from Canton, Mass, by Dr. S. Cabot. A Fox, Eagle, *Strombus gigas*, and three specimens of *Cassis*, by Dr. A. Coolidge. Sixteen specimens of Diurnal Lepidoptera, from a locality south of San Francisco, Cal., by Mr. Samuel Hubbard. A female *Diaphomera femorata* alive, from near Boston, by Mr. T. W. Willard. Sixty specimens of fishes labelled by Prof. Theo. Gill, from the Smithsonian Institution. Polished glacial boulders from Bethel, Me. by Dr. N. T. True. A Pickerel, from East Lexington, Mass., a specimen of Clytus, from Boston, by Mr. C. J. Sprague. A Rodent, Frog, Lizard and hymenopterous insect, fifteen specimens of Mollusca, two Crustacea and one Myriapod, from Zanzibar, by Dr. A. A. Gould. Cast of the Head of John Rouse, an idiot, by Dr. Lyman. A Field Mouse, from Cambridge, Mass., by Mr. Horace Mann. A specimen of *Leptocephalus*, from Bethel, Me., *Mesothemis Poeyi* Scudd., *Agrion coecum* Hagen, *A. Maria* Scudd., *Libellula auripennis* Burm., and twenty additional specimens of Odonata, from Isle of Pines; *Cordulia eremita* Scudd., *C. elongata* Scudd., *C. Shurtleffii* Scudd., *C. forcipata* Scudd., *C. lateralis* Scudd., *Diplax rubicundula*, from the White Mountains, N. H., by Mr. S. H. Scudder; a Japanese Cat, from Jamaica Plain, a spider, from Campton, N. H., by Mr. W. L. Parker. Five larvæ of Dermestes, by Dr. J. C. White. Skull of Black Bear, from Hopedale, Labrador, Specimen of Labradorite, from near Hopedale, Labrador, by Dr. A. S. Packard, Jr.

October 4, 1865.

The President in the chair.

Twenty-three members present.

Dr. B. G. Wilder exhibited specimens, living and preserved, of both sexes of a large and but little known species of geometrical spider, *Nephila plumipes?* from the coast of South Carolina, together with silk of a brilliant yellow color, which he had reeled directly from the living insect; and gave the following account of the species and of the hitherto unknown method of obtaining its silk.*

*While this was passing through the press I found in the Astor Library, New York, a copy of a rare Italian work by R. M. de Zermeyer, entitled "Richerche e sperimenti sulla seta de Rogni," in which is described his process of obtaining silk directly from spiders. But no allusion is made by others, to either the idea or the book itself, which was published about 1800. I find also that in Jones' "Naturalist in Bermuda," 1859, page 126, is described an experiment of the author for ascertaining the strength of the silk of *Epeira* (*Nephila*) *clavipes*, by drawing the silk out of its body.

By a letter written on the 20th of August, 1863, from the camp of the 55th Mass. Vol. Inf., at the north end of Folly Island, South Carolina, I find that "on that day I caught a large and very handsome spider, from which, as it stood quiet near the top of my tent, I wound off silk upon a quill for an hour and a quarter, at the rate of six feet per minute, making four hundred and fifty feet or one hundred and fifty yards."

This silk is still in my possession, but has been removed from the quill for the purpose of ascertaining its weight, which is one-third of a grain. I had never heard of this method of obtaining silk; neither had I ever seen or read of such a spider; but, though this specimen was not preserved, I was so impressed with its size and the peculiar aspect given by the brushes of stiff hairs upon the legs, that when, during the following summer, another officer * of our regiment described to me a large spider very common upon Long Island, which lies just west from Folly Island, I knew it was the same species and told him what I had done, adding that I was "sure something would come of it sometime." By substituting a cylinder worked with a crank, for mine turned in the fingers, this officer obtained more of the silk, which he wound in grooves cut upon rings of hard rubber, and in other directions upon the sides of such rings; while another officer; † by employing a "gear drill stock" with cog-wheels, accomplished similar results still more rapidly; on the first simple machine I wound off silk into two grooves cut in the periphery of a hard rubber ring, parallel except at one point where they crossed to form a kind of signet, the silk being guided at this crossing by a pin upon a pivot moved by the hand at each revolution of the ring; and on the "gear drill stock" upon a larger ring one inch in diameter and three-eighths of an inch in width, in a groove upon its periphery one-fourth of an inch in width, and across the sides of the ring in two directions, I wound *three thousand four hundred and eighty yards*, or *nearly two miles of silk*. This length was estimated by accurately determining the different dimensions of the ring where wound upon, and multiplying by this the number of revolutions of the cylinder per minute (170), and this product again by the number of minutes of actual winding (285), having deducted from the gross time of winding (about nine hours), each moment of stoppage for any cause.

This was in the autumn of 1864, and so the matter rested till Feb. 1865, when, preparing to present the subject to the Society, I showed specimens of the spider and silk to Professors Wyman, Agassiz, and Cooke of Harvard University, to all of whom both the species of

* Major Sigourney Wales, 55th Mass. Vols.
† Lieut. Col. Chas. B. Fox.

spider and the kind of silk were entirely new* as was also the idea of reeling silk directly from it or any other insect.

At this time too, a friend † to whom the whole history of the matter was known, expressed his confident belief that this new silken product could be made of some practical utility, especially in view of the anticipated scarcity of the ordinary silk; and it is with his advice and assistance that the experiments and investigations recounted below have been made as far as our limited time and means have allowed.

On the 30th of August, 1865, I obtained from Long Island some living specimens, chiefly females, and have succeeded in bringing a few of them to the North.

I find no mention of this spider in the works of Hentz or any other American entomologist, which may be the result of its being very circumscribed in its locality to a small and unimportant island; but in "Die Arachniden," by C. L. Koch, Vol. 6., is a figure of a mutilated female specimen, the only one ever collected, and said to have been found in Louisiana, which was preserved in the Museum of J. Sturm at Nuremberg.

The description and figure of this specimen are so unsatisfactory that I am really in doubt as to its identity with the spider under consideration, but will provisionally regard the latter as the *Nephila plumipes*, hoping at some time to settle the point by an actual comparison with the unique specimen described by Koch.

I append here a description and figure of the spider drawn from living individuals.

Nephila plumipes Koch.

A large and very elegant species, resembling most of its congeners in the general form of the body, and like *N. clavipes* and *N. fasciculata* possessing peculiar collections of stiff hairs upon the legs, but differing from them in that these hairs are more closely set together, so as to justify the German term "Häarbürste" (Hair brushes).

The cephalothorax is black above, but covered, except in spots, with silver-colored hairs. The abdomen is olive-brown variously marked with yellow and white spots and stripes. On the 1st, 2d, and 3d pairs of legs are one or two brushes of stiff black hairs, pointing forward away from the body. The length of the body is from 1 to 1.10 and the spread of the legs 2.75 in a lateral, and 3.75 inches in a longitudinal direction.

The above applies only to the female, which will now be more minutely described; the male is very small and differently marked.

* Prof. Wyman has since found among his alcoholic specimens of insects collected in the South, one female individual of this species, but is not certain of the precise locality in which it was obtained.

† Dr. William Nichols of Boston.

The entire upper and anterior surface of the cephalothorax is jet black, but behind the eye-spots it is thickly covered with little white hairs, except in six spots, three upon each side over the origins of the three anterior pairs of legs; the first pair of spots being the largest and pointing obliquely forward and outward. The edges of the cephalothorax are reddish-brown. The eye-spots are black and eight in number, four in the centre in form of a square, and two upon each side, one above and one below a rounded elevation. The falces are black. The abdomen above is light yellow. On each side of the middle line are six silvery spots, of which the 1st and 3d pairs are the largest, then the 2d, 4th, 5th, and 6th; the three anterior pairs are rounded, the others flattened laterally. On the middle line between the 1st and 2d pairs, and again between the 3d and 4th pairs, the pulsations of the dorsal vessel are visible; besides the larger spots there are many smaller ones irregular in size, shape and position, but more numerous anteriorly. The anterior edge of the abdomen is olive-brown; in front of and below it is a silvery cross stripe semilunar in shape, the horns pointing backward; and just behind it is a similar stripe.

The sides of the abdomen are lighter than the top and the spots are generally silver-colored and oblong, especially in the line of the horns of the above mentioned white stripe. The lower surface is still darker than the sides, but the anterior third is a hard and horny plate with a free posterior edge covering the generative orifice. The surface of this is by its coloring divisible into three sections, one median and two lateral, each of which is again composed of a broad anterior and a narrow posterior portion. The anterior median portion is brown and depressed between the lateral portions, which are black and slightly punctate and bordered internally by a yellow, and externally by a dull reddish stripe; the posterior median section is dark brown, raised and quite convex, while the lateral portions are dull red and flat, with sharp posterior edges.

The middle third of the lower surface of the abdomen is dull red without spots and separated from the sides by yellow stripes or series of spots, and from the posterior third by several yellow spots; this third is also dull red and without spots, but not so distinctly separated from the sides; behind the posterior third, and forming its boundary, is the group of spinnerets, or mammulae, of which there are two principal pairs, anterior and posterior. Between these and concealed by them is a very small pair, the nature and use of which I have not yet ascertained. In color the mammulae are dull red, but the apices are surrounded by short black hairs; behind the spinners and enclosed in the same fold of integument is a median papilla through which the excrement is voided. The posterior surface of the abdomen is flattened, and resembles the sides in color and marking. The lower surface of the cephalothorax is shield or heart shaped, black in the centre but dull red at the sides.

The 1st and 2d segments (shanks) of the limbs are dull red; the 3d segment (thigh) is dirty yellow, but in the first, second and fourth pairs the distal third is dull red, and covered with a brush of stiff black hairs; the depth of the color and the size of the brush decreases from the first to the fourth pair; the thigh of the third pair is perhaps a shade darker where the brushes are upon the others. The 4th segment is dull red in all the legs; the 5th is, in all, dirty yellow as to its proximal portion (a little less than half) while the distal portion is dull red. In the third pair it presents a few scattering black hairs, but on the other three pairs there is a hair brush like that upon the thigh, completely encircling the limb, but the hairs are set a little more nearly at right angles with the surface. There are also a few black hairs on the under side just at the junction of the 5th with the 4th segments, and in the third pair a few in the place of the hair brushes on the others. The proximal portions, (again less than one-half) of the 6th segment (1st of the foot) is dark dirty yellow and the distal portion, with the 7th segment, is dark dull red, or nearly black, and both segments are covered with short black hairs. Upon the proximal yellow portion of the 3d and 5th segments are very fine short hairs, with a few longer ones intermixed.

The outer half of the maxillæ is dirty yellow, the inner half, with the 1st segment of the palpi, dull red; 2d segment dirty yellow and covered by very small black hairs, the 3d segment is dull red, likewise the 4th and 5th, the latter being nearly black and thickly covered by black hairs.

Of the eight eyes, the four intermediate ones form a square, and are set at the four corners of a prominence; the lateral eyes are set upon the extremities of two more oblique tubercles, those of each pair being separated from each other by more than their own diameter, and looking, the one downward and forward and the other upward and backward.

The body of the male is one-fourth of an inch in length, and his legs spread less than one inch in a longitudinal and three-fourths of an inch in a lateral direction. The general color of both body and legs is dark-brown, the former presenting a median dorsal stripe of a darker color, and the latter a few scattering black hairs, but no such brushes as those of the female. His palpi are strongly clavate at the middle of their length and end in a sharp point turning outward.

I have never, during a two years' stay on the coast and in the interior of South Carolina and Florida, met with any traces of this spider elsewhere than near Long Island; nor, with the exception of the first specimen found upon Folly Island, and a cocoon found in a tree on James Island, have I seen it upon the adjoining islands, though there seems no reason why it should not also occur all along the seacoast.

Long Island is a low, narrow, uninhabited strip of land about five miles southwest from Charleston, surrounded on all sides by creeks and in the midst of a great salt marsh. The spiders are found in the forest, building their webs between trees and shrubs, sometimes within reach, but more often ten or fifteen or even more feet from the ground so as to be reached by the sun. The web is very large, from three to four feet in diameter, quite strong and very viscid; its yellow color is seen in the sunlight, or when the web is gathered into a mass. It is composed of two kinds of silk, of which one is white or silver-gray, inelastic and perfectly dry; the other is of a bright yellow or golden hue, very elastic and studded with little globules of gum which render it exceedingly adhesive; the *frame-work* of the web, namely, the guy-lines or stays and the diverging lines or spokes of the wheel-shaped structure, is all composed of the former or silver colored, dry and inelastic silk, while the concentric circles which serve for entangling the prey are composed of the latter, or golden, elastic and sticky silk; these circles are very numerous, being generally less than one-third of an inch apart, but for the further strengthening of so large a web, between every eight or ten* such circles occurs one of the silver colored silk; these latter are made before the viscid lines, but neither of them are in the web of this species spiral, as in the web described by Blackwall and others,† on the contrary they seldom if ever, form complete circles, but are looped and return in the opposite direction into a corresponding point at the other side of the web, leaving above the centre a space occupied only by radii through which the spider can pass to either surface of her web, the greater part of which, therefore, is below the point where the radii converge, the dry lines are not destroyed on the completion of the web, but remain and seem necessary for its stability.

As might be inferred from these facts this spider not only has the power of regulating the *size* of its thread, according as one or two, or three, or four of its mammulæ are pressed upon the surface from which the line is to extend, or as a greater or less number of the spinnerules in any mammula are employed; but can also use in the construction of its web, either the white or the yellow silk at will; for of its two principal pairs of mammulæ, one, the anterior, yields the *yellow*, while the other or posterior pair yields the *white* silk. Of this I satisfied myself

*The number varies according to the individual and even in different parts of the same web.

† Zoölogical Journal, Vol. V., p. 181.

by carrying the thread from the anterior pair of mammulæ upon one part of a spindle and that from the posterior pair upon another, guiding them with pins while the spindle was in motion; the result being the formation of two circles of silk, one of a golden, the other of a silver color, as in one of the specimens exhibited; morever, if while both threads are being drawn out, they are slackened, the lower silver thread will wrinkle and fly up, being inelastic, while the other will contract and, within certain limits, preserve its direction. At that time the existence of a smaller pair of mammulæ intermediate between the other two, was unknown to me, and it is possible that the yellow line proceeded from them, and that both the larger pair yield the white silk. Most of these experiments were made in the field under unfavorable circumstances and will be more accurately repeated.

The careful dissection of an alcoholic specimen will readily discover the organs from which this silk proceeds, and which have been described in other species by several authors; the preparation exhibited to the Society shows one set of silk-glands consisting of six elongated yellow bodies, more or less convoluted and measuring about one-third of an inch in length, lying under the integument of the lower surface of the abdomen, three upon each side of the middle line; the excreting ducts, one for each gland, are also plainly visible. But beside these, there are to be found at least four more glands, of which one pair shorter but thicker and larger, and also of a yellow color, are located in the upper and anterior angles of the abdomen; while the other two glands are white, or transparent, and lie nearly in the center of the abdomen; the ducts of all these glands are easily traced to the region of the spinnerets, but I have not yet observed the precise mode of their termination. It will be noticed that the yellow silk is secreted in greater abundance, as also that it is more extensively employed in the construction of the web.

All these glands contain a semi-fluid and very viscid gum which may be drawn out into threads of variable diameter; these however, being single and not, like those spun by the spider, minutely compound, break up on being sharply bent.

A familiar, but thus far unexplained, fact is, that while the yellow thread as spun by the spider in its web is so exceedingly viscid on account of the numerous globules of gum with which it is studded, as to follow the point of a pin, this same yellow silk when reeled from the insect, whether slowly or rapidly, and also when employed by the spider to form the cocoon about her eggs, is perfectly dry and much less elastic and yielding, though still more so than the white variety. I have put several specimens under the influence of chloroform which apparently has no effect upon the evolution of silk.

I have never been able to reel above three hundred yards of silk from a spider at one time; but this evidently does not exhaust the supply, for on opening the abdomen the glands are still partially filled and the following day a quantity equal to the first may be obtained; this I did upon three successive days, so that, if, as now seems probable, the emission of the silk is mainly mechanical, then a certain degree of preparation is necessary after it is secreted before it is ready for use.

The diameter of the silk as spun by the insect or as reeled from it, varies from $\frac{1}{6000}$ to $\frac{1}{1000}$ of an inch; * it is exceedingly strong, but I have not yet been able to accurately determine its strength as compared with fine ordinary silk. The largest threads are those composing the outer layer of the cocoons, but these are evidently compound, and the two, three or four strands are apparently such as proceed from the single spinners, the minute fibrils of which have united at once on leaving the spinnerules so as to form the ordinary silken fibre which generally appears simple under the microscope.

Having completed her web, the female stations herself at its centre head downward, waiting for prey; the diminutive male (they are not constantly present) preserves a respectful distance from her, and, as far as I have seen, never attempts to do anything for himself, except of course the impregnation of the eggs; he builds no web and catches no prey; and while she is moving from place to place, or even while making her web, he gets upon the upper or lower side of her abdomen holding on with his legs and darting about to keep out of the way of hers; for she seems to pay no attention to him and might easily do him an injury even by accident.

On one occasion I saw a male stray away from his proper home to an adjoining web, from which, however, he was speedily driven by the indignant female possessor, with the loss of two of his legs; of which injury he shortly afterwards died.

In the webs of these spiders are found insects of all kinds, even the largest and most vigorous, such as the great cicada of the South. When anything strikes the web, the spider instantly starts, and, if the vibrations indicate that it is suitable for food she rushes to it and seizing it in her powerful jaws holds on till it is dead; after which she throws a net around it and carries it to a place where she can devour it at her leisure; in this respect unlike some other geometrical spiders, of which one species, common on James Island, S. C., never attempts to seize the prey with the jaws till it has first dexterously spread a net over it by turning it over and over with the first and third pairs of legs and, with the fourth pair, used alternately, drawing out the silk as a broad white band.

But if the violent struggles of the prey show it to be of large size, then our spider advances with caution, feeling with her anterior legs,

* The micrometer measurements were made by Mr. R. C. Greenleaf.

and if satisfied that she can do so with safety, will suddenly close with the victim; but if not, or if some foreign body is placed in the web, then she will snip off with her jaws every line which supports it till it drops to the earth; this I saw done by several spiders, which had made their webs in my room in South Carolina, with a dead snake six inches in length.

It is remarkable, that although these spiders possess eight eyes and can evidently distinguish light from darkness, yet, so far as my observation goes, they cannot *see* anything at all whether near or remote; they pay no attention to an object put close to them nor to the quiet movements of any one about them, and will often rush by an insect entangled in their web if it chance to cease its struggles before the spider has accurately determined upon its position; it will then slowly return to the center of the web and wait till another vibration indicates the whereabouts of the insect; a fly offered to it upon the point of a needle will not be noticed till it begins to buzz, when it will be seized at once; the hearing and touch are evidently very acute; the organ of the former sense is not known; the latter is exercised by the palpi and by the extremities of all the legs, especially those of the first pair, which are continually used as feelers. How acute the sense of smell is I do not know.

This spider is remarkably quiet in its habits, never leaving its web unless disturbed in some way, and it bears handling better than any species with which I am acquainted. That it can bite is evident from the size of the jaws and the firmness of their hold, and that the venom is active is shown by the speedy death of its victims;* but they never attempt to bite unless provoked, and may be allowed to run over one's flesh with impunity, care being taken not to remove them from it suddenly or roughly for they are apt to hold on with the jaws when the grasp of the legs is not sufficient. The length and comparative weakness of the legs renders it easy to put this spider in the only position in which any spider can be safely handled, namely with all the legs held behind the back. In their webs they are active and sure-footed, but slow and awkward on the ground or any plane surface. They always prefer the light, and construct their webs where the sun can reach them; the young manifest the same instinct and always seek the sunny side of a glass vessel containing them; they also keep the

*Blackwall, (Linn. Transactions, Vol. xxi. page 31-37) recounts experiments to support his opinion that the bite of the larger British species causes no more injury to man, to other spiders, or to insects than an ordinary puncture or laceration of equal extent and severity; and the same author in his Spiders of Great Britain and Ireland, Part 1, p. 2, does not even mention the word *poison* in speaking of the colorless fluid emitted through the falces, but although we seldom hear of well authenticated cases of injury from the bite of a spider, it would hardly be safe to suppose all of them harmless.

head downward and will instantly turn over if the vessel containing them be inverted.

The eggs are laid in a rounded, or flattened mass about one half an inch in diameter; they are .04 to .05 of an inch in diameter, white and at first slightly agglutinated together, but become yellowish and easily separable as the time for hatching arrives, which, in the case of some eggs laid this fall was in about thirty days; the young spiders are yellow with whitish legs, which however soon become darker in color while the abdomen presents some faint markings on its surface; some have cast one skin within a few days and can spin a thread within a week after leaving the egg; but of their own accord they do not leave the cavity of the cocoon for some time, during which, as far as I know, they take no food, excepting perhaps that they devour one another, but seem to undergo an increase of the legs and cephalothorax at the expense of the abdomen; but for some reason, whether on account of thé elements, or birds, or other insects, or the attacks upon one another, I cannot say, only five or six out of the five or six hundred hatched in any one cocoon ever come to maturity in the natural state.

The mass of eggs is enclosed in a loose silken cocoon, the threads of which are very large and strong, especially the outer ones, which are $\frac{1}{1000}$ of an inch in diameter while the interior ones are $\frac{1}{2000}$ of an inch in diameter; this cocoon weighs from .320 to .655 of a grain.

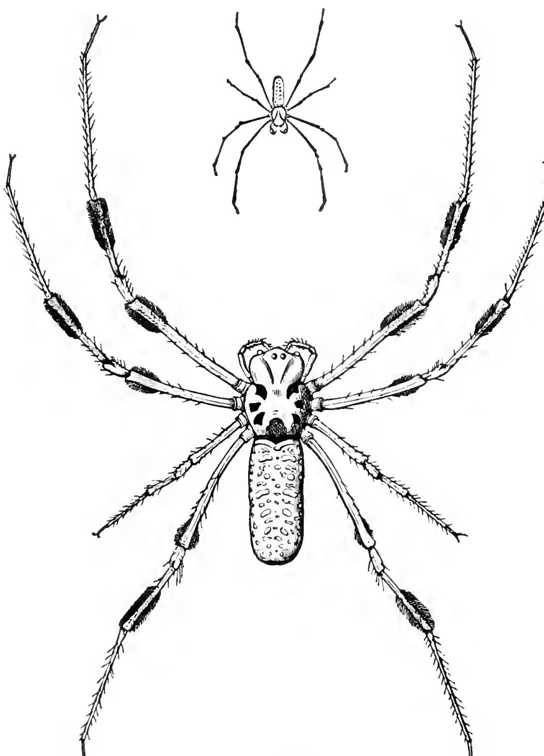
The grown females, which I have kept alive for one month or more, in boxes or in webs constructed in my room in South Carolina, have all readily taken, from the point of a needle, live flies or bits of fresh chicken's liver, from which they suck the juices; they likewise take water from the point of a stick or hair pencil, holding the drop between the palpi and the jaws while it is slowly swallowed; one spider has thus taken six drops of water in succession.

Much more might be related concerning the habits of the insect, of the manner of keeping and feeding the young, of the means of securing the spider while its silk is obtained, and of the various apparatus employed; but I am so impressed with the peculiarities thus far observed in themselves, and with the beauty and strength of the silk that if time and means permit, I shall continue the inquiry as far as possible, and will defer to a future occasion a more complete account of the spider, its habits, anatomy and embryology, and of the various qualities of its silk, with whatever conclusion can be reached concerning the practicability of rearing the young, and also how far it is possible to apply the same method of extraction to the silk worm, and other silk producing larvæ.

NOTE. April 2d, 1866. Some of these spiders, hatched in October, 1865, are now more than an inch in length.

It is but recently that I have had the benefit of an acquaintance with the investigations of others upon the economy of the geometrical spiders; and in the entire absence of any American works on this subject, I will refer to the memoirs of Blackwall and other British naturalists published in the Linnæan Transactions, Vols. xvi., xviii., and xxi., in the Zoölogical Journal, Vols. iv. and v., in the Transactions of the Entomological Society, Vols. i., ii., and iii.; Entomological Magazine, Vols. ii. and iii., and Reports of the British Association for 1844 and 1858. The earlier papers are quoted in Kirby and Spence's Entomology, while a brief synopsis of nearly all is contained in the introduction to Part 1. of Blackwall's Spiders of Great Britain and Ireland, published by the Ray Society in 1861 and 1864.

Many of these opinions have been confirmed by my observations upon the *Nephila plumipes*, and where it is otherwise stated, the differences may sometimes (as with the construction of the webs, mentioned above) be in consequence of specific peculiarities.



Nephila plumipes Koch.
The smaller figure, the male; the larger, the female.

Dr. A. A. Gould, in referring to the recent death of Mr. Hugh Cuming of London, gave a sketch of his life and scientific services.

A letter of resignation as Curator of Herpetology from Dr. F. H. Brown was read. It was voted that his resignation be accepted, and on motion of Dr. White, a committee of two, consisting of Dr. J. C. White and Mr. F. W. Putnam, were appointed to nominate a successor.

Mr. Putnam, in referring to two young Gar Pike presented this evening, said that they were the only specimens in the Society's collection, showing clearly the banded structure of the young of this species, which by Richardson was described as the *Lepidosteus huronensis.* This species has received three names from DeKay and another authority, while a still younger form was placed in a distinct genus by Rafinesque.

The following paper was read:

Notes on some Odonata from the White Mountains of New Hampshire. By. S. H. Scudder.

The following notes have reference mostly to the colors during life of some species of Odonata taken in the summer of 1862 by my valued friend, the late Mr. C. A. Shurtleff, and myself during a visit of a few weeks at the Glen, White Mountains. Most of them were taken at Hermit Lake, a small pool of water situated in the forest at the mouth of Tuckerman's Ravine, where they were so abundant that dozens of specimens of a single species might be taken in a single hour; all our visits to this spot taken together did not amount to more than three or four hours, yet some hundreds of specimens were brought away. In proportion to the number of specimens obtained, very many were of species as yet undescribed, especially in the genus Cordulia, where it proved to be the case with all of them. Doubtless many, if not all, of these are identical with those of northern habitats in Selys' Collection, of which the names only are mentioned in Hagen's Synopsis. Nine species in all are referred to, of which eight are believed to be new.

Cordulegaster lateralis *nov. sp.*

♂. Vertex and rhinarium black; front, epistoma and labrum, except the anterior edge of the latter, which is reddish-brown, very pale green (as in life); labium luteous (in life dull pale reddish-brown); occiput luteous (in life, yellowish-green in front, greenish-yellow behind) edged on all sides with black, and crowned with a transverse comb of long black hairs which extend along a black band bordering the eyes on either side above; except this the parts behind the eyes are brownish-yellow (in life dirty pale green); the eyes in life are grass-green; thorax black, a little ferruginous along the middle of the dorsum; dorsum with a large cuneiform stripe on either side, approximate above, pointed and divaricate below, rather pale green in life; a mesothoracic and metathoracic very broad oblique stripe lemon-yellow in life, and midway between them a narrow, inconspicuous yellowish-brown stripe (color in life not noted); wings hyaline, very slightly infuscated; pterostigma fusco-ferruginous; membranule white; legs black, anterior femora with a ferruginous tinge on anterior surface; claws with a minute inferior median tooth; abdomen black, a spot on segment 2 below auricle and another upon genital lobe, an indented stripe on sides of segments 1–3, a sub-triangular spot on the sides of segments 4–8 in the middle, and a minute spot on side of segment 9 at base yellowish tinged more or less with brown (in life bright lemon-yellow); abdomen a little inflated at the base, segment 3 a little constricted, beyond nearly equal, but segments 7–8 expanding a little; appendages black, superior pair short, about three-fourths the length of segment 10, straight, parallel, subtrigonal at base, depressed and laminate at apex, the apex slightly expanded interiorly, obliquely docked interiorly, pointed just before the middle, inferiorly, a pretty large recurved tooth; inferior appendage, broad, very short, a little rounded, the sides strongly auriculated, the auricles extending backward, outward and upward, obscurely bidentate. 18–21 antecubitals; 14–16 postcubitals; two rows of discoidal areolets.

Length 2.08–2.30; alar expanse 3.02–3.14; pterostigma .13–.14 in. White Mts., (the Glen). 4 ♂. June 17, July 26 and middle of August.

Æschna constricta Say.

I obtained both sexes of this species in abundance, differing in the markings, especially of the abdomen, from Hagen's description. The dorsal stripes of the thorax are interrupted or absent in the ♀ as described by Hagen in *Æ. multicolor*, the pleural stripes are bordered with black; on the abdomen I find the following markings: segment 1 with a transverse apical blue band; segment 2 with a narrow dorsal median stripe, the sides with a transverse middle narrow stripe, expanding below (upon the auricle in the ♂) just failing to reach the dorsal stripe, yellow or yellowish-green, the apex with a broad transverse green or greenish-blue band; segments 3–10 with a quadrangular apical dorsal spot, divided in the middle; 3–8 with a similarly divided dorsal triangular spot, becoming a transverse line on posterior segments, central anteriorly, approaching the base posteriorly; the sides of segment 3 at base with a whole, those of 4–8 near the base with a divided spot, all either pea-green (♂) or pale grassy green (♀).

The colors during life of other parts of the body are as follows:—whole face yellowish-green (♂) or dull luteous-green (♀); eyes above bright grass-green (♂) or dark green (♀); thorax reddish-brown, dorsal stripes pea-green (♂) or grass-green (♀); pleural stripes pea-green, yellowish below, bordered with black; hind border of metathorax with a bright blue roundish spot; abdomen brownish-black (♂) or dark reddish-brown (♀); pterostigma fuscous (♂) or luteous (♀); appendages of ♀ foliaceous. One ♀ differs from the others and from the ♂ in having a much less constricted abdomen immediately behind the inflated base, and has no spots on the dorsum of segments 8 and 9, while in others those of these segments are largest. 7 ♂. 7 ♀. White Mts. August.

Æschna eremita *nov. sp.*

Vertex and occiput yellow; front and epistoma bluish-green, at the sides greenish-yellow, above with a T-shaped spot extending slightly and indistinctly upon the face; a narrow band before the eyes, the incisure between front and epistoma and abbreviated dashes in the pits of the latter, black, the dashes sometimes brownish; maxillæ and labium greenish-yellow; eyes dark brown with a greenish tinge. Thorax reddish-brown, the elevated portions and sutures marked with black, each side of the dorsum with a streak, somewhat like a reversed !, when viewed from the front, blue; pleura with a broad mesothoracic stripe, deeply excavated anteriorly above the middle, on the metathorax a somewhat similar one, but broader at the base, a spot midway between them above, sometimes prolonged to a narrow abbreviated stripe, all bordered with brownish-black, either blue above and more or less greenish below (♂) or slightly yellowish-green (♀); wings hyaline, the veins black, femora and tibiæ reddish-brown superiorly; abdomen dark brown (♂) or very dark yellowish-brown (♀); segment 2 with a longitudinal dorsal line, the whole apex, and in the ♂ a lateral spot just above the auricle, sides of 3–8 with a basal lateral divided spot quadrangular except on 3 where it is very large and broadest at base, apex of 3–10 with a sub-quadrangular apical spot on either side of the dorsal line more or less confluent with an irregular apical lateral spot on 3–9, either blue, those on sides duller (♂) or yellowish-green, those on segments 6–10 duller (♀); segment 2 with a median transverse, narrow, straight band, broken on the middle of dorsum, segments 3–7 with a median (3–4) or sub-basal (5–7) transverse triangular spot on either side of dorsal line, approximate, either brownish-yellow (♂) or yellowish-green (♀); 10th segment with a basal median tubercle and a lesser one on either side of it; superior appendages of ♂ fuscous, foliaceous, narrowed at base, obtuse at apex, a blunt basal tubercle above slightly concave, beneath a little elevated, and the sides depressed at apex, sub-carinated above toward the inner edge, the carina more central and elevated near apex, its edge denticulated, inner edge sub-villose; inferior appendage fully half as long, triangular appendages of ♀ straight, foliaceous, concave beneath, convex and sub-carinate above, auricle of ♂ with 5 sharp incurved teeth on lower outer edge. 17–21 antecubitals; 13–17 postcubitals.

Length 3 in.; alar expanse 3.9 in.; pterostigma .16 in.; superior ♂ appendage .2 in. 14 ♂, 2 ♀. White Mts. August.

The colors given are those of the living specimens.

Æschna propinqua *nov. sp.*

Vertex and occiput yellow, front and epistoma yellowish-green, labrum paler, rhinarium brownish; a distinct T-shaped spot on top of front, a narrow band next the eyes and the incisure between front and epistoma, black; labium indistinct bluish-yellow; eyes either bright or bluish-green (the head is wanting in my ♀). Thorax either reddish-brown (♂) or rather light brown with a castaneous tinge (♀); elevated portions and sutures black; dorsum with a curved antehumeral streak, pointed anteriorly, slightly angulated at posterior extremity, either pea-green (♂) or faint pale green (♀); a meso- and meta- thoracic, rather broad, straight streak, sometimes distinct only beneath, sometimes separated, generally rather broadly bordered with blackish, either pea-green, upper portion bluish or when separated, blue (♂) or the mesothoracic very pale pea-green, the metathoracic pale bluish (♀); wings hyaline, the costal border especially toward tip sometimes very indistinctly pruinose, the veins black, those of anterior border yellowish; pterostigma black (♂) or fuscous (♀); membranule blackish, pale at base; legs black, the femora with a reddish streak superiorly at base (♂) or fuscous, the femora reddish brown (♀); abdomen, blackish-brown (♂) or castaneous, segments 3–6 lighter brown anteriorly (♀); it agrees in the character of the markings with *Æ. eremita*, except that the apical dorsal spots are not confluent with the apical lateral ones, except on segment 3, and the lateral ones are only present on 3–6. In the ♂ the colors of the spots are all blue, except the large lateral spot of segment 3 which is brownish-blue, and the median transverse band of segment 2, and the triangular dorsal median spots of the segments following which are yellowish. In the ♀ the lateral spots of segment 2 are pale bluish, the lateral spots of the other segments, lavender-colored; the median dorsal triangular spots are pale dirty yellow; the apical dorsal spots very pale dirty bluish, more decided in tint on posterior segments; segment 10 of ♂ with a prominent, bluntly pointed basal tubercle, 9 only carinated on basal half; segments 8–9 in ♀ not carinated; appendages of ♂ blackish, long, foliaceous, nearly straight, narrower toward the base, the apex rounded, a superior tubercle at the extreme base interiorly, carinated along the median line above, the apical portion very slightly curved upwards; inferior appendages nearly two-thirds as long as the superior, triangular; auricle with four teeth; appendages of ♀ long, straight, foliaceous, narrower at base, rounded at apex, carinate above, black. 17–21 antecubitals; 10–12 postcubitals.

Length 2.75 in.; alar expanse 3.64 in.; pterostigma .17 in.; abd. app. of ♂ .2 in. 3 ♂. 1 ♀. White Mts. August. The colors given are those of the living insect.

Cordulia eremita *nov. sp.*

Vertex, front, except lower border and sides, which are yellowish-brown (in life light reddish-brown) brassy-green as in life; epistoma bronze-brown (in life reddish-brown); rhinarium pale as in life; labrum black as in life; labium luteous (in life pale smoky with a bluish tinge); occiput blackish-brown (as in life), furnished with black pile above, and pale pile behind, eyes in life brassy-green, thorax furnished with long greenish pile, shining brassy–green as in life, a humeral spot, and a single mesothoracic boat-shaped stripe not reaching either base or apex, just in advance of the mesothoracic stigma, subparallel to the sutures, but its upper limit distant from the metathorax, and its lower approaching it, luteous as in life; wings hyaline, those of the ♀ usually indistinctly sub-fumose; pterostigma reddish-brown; membranule blackish-brown, base (basal half in ♀) white; legs black, fore femora with a postero-superior reddish-brown vitta; abdomen, very dark brassy-green, almost black (as in life) covered with short greyish pile, the incisures reddish-brown (pale luteous in life); an indistinct reddish-brown spot (as in life) on the sides of segment 2 at the apex, apex of the 10th segment luteous at the side (♂) or in addition to that a reddish-brown spot at basal half of 3 and at base of 4–6 on the side (♀); segments 4–5 especially basal half, and somewhat on 3, 6, granulated; abdomen of ♀ equal, swollen at the base; abdomen of ♂ with the 3d segment much constricted; superior appendages of ♂ consisting of a main stem and an apical process; the former is sub-depressed apically, carinate beneath; viewed from above the sides are parallel, the inner edge straight, the outer slightly swollen at base and apex and furnished with a tubercle just past the middle, the inner edge furnished with a row of hairs directed outwards somewhat, which continue on to the outer posterior angle; the inner posterior angle is produced into the apical process, which is about one-half as long as the main stem, continuous with the lower surface, laminate, a little more than half as broad as the main stem, directed inwards and backwards equally, the apical half recurved upwards, the apex pointed; the inferior appendage is triangular, reaching more than half way to the extreme apex of the superior appendages, its apex minutely uncinate above; appendages of ♀ cylindrical, straight, constricted at the base, the apex bluntly pointed, vulvar lamina bifid; two discoidal nervules, (sometimes three, at the triangle), then three. 7–9 antecubitals; 7–10 postcubitals.

Length 1.86; alar expanse 2.92–3.08. ♂ appendages (exclusive of apical process) .11 in. ♀ .15 in. Pterostigma .11. 39 ♂, 8 ♀ Hermit Lake, August. Eggs lemon-yellow, ovoid, subacute at either end, not smooth, .02 in. long, uniform in size. It is allied to *Cord. septentrionalis* Hagen.

Cordulia forcipata *nov. sp.*

Vertex, most of front, occiput and labrum dark brassy-green, as in life, the occiput and labrum less brassy; epistoma and sides and lower edge of front, dark yellowish-brown (in life luteous); rhinarium dark luteous (in life luteous); labium luteous as in life; upper half of eyes, in life, grass-green, lower half indistinct purplish; back of head black, back of occiput with an indistinct reddish spot; thorax covered with long greyish pile, brassy-green, as in life, the dorsum in front black, anteriorly with an indistinct fulvous spot as in life, the pleura with a mesothoracic and metathoracic central indistinct ill-defined bar, fulvo-luteous as in life; wings hyaline, extreme base of posterior pair, including but little more than the triangle bordering the membranule subfumose; pterostigma fusco-ferruginous; basal half of membranule, white, apical blackish-brown; legs black, anterior femora, except apex, with a confluent posterior and superior fulvo-ferruginous vitta; abdomen obscure deep brassy-green, segments 5–10 mixed with brownish (as in life), the whole of the sides of segments 1 and 2, on the latter extending on to the genital lobes, and the base of segment 3, marked with indistinct fulvo-luteous (as in life); sides of segments 5–8, on 8 indistinctly, with a round basal spot fulvous; appendages black, inferior ones testaceous above, superior pair carinate inferiorly and on the basal half exteriorly, sub-cylindrical; when viewed from above the basal half is straight, swollen, constricted just beyond the base, especially on the interior edge, the apical half bent slightly outwards, then inwards, the inner edge rounded off to the pointed apex; when viewed laterally they are seen to be curved downwards considerably, the apex laminate, the lower edge with a small basal exterior tooth, beyond the middle a prominent tubercle, and between them the interior edge produced to a rather large rounded lamella, more prominent toward the base; inferior appendage triangular, bluntly pointed, the edge of the under surface raised on the basal half, curved upwards, the tip minutely uncinate above and reaching fully the tubercle of the superior pair. 8 antecubitals; 8–9 postcubitals, two rows of discoidal areolets.

Length 1.90; alar expanse 2.60; pterostigma .09; superior abdominal appendages .14. 1 ♂. July 26. The Glen, White Mts.

Cordulia Shurtleffii *nov. sp.*

♂ Vertex and front, except sides and lower edge, bronze-green, as in life, the latter edge with reddish-brown; vertex with a purplish lustre, as in life; occiput as in life, indistinct bronze-green, with a slight purplish lustre; sides and lower edge of front and the epistoma dark olivaceous (in life dark reddish-brown); rhinarium pale; labrum black; labium light brownish-yellow as in life; eyes in life bright grass-green, reddish-brown at the tubercle; thorax brassy-green with a ferruginous tinge below and on mesothorax (as in life), black next the base of the femora, covered with grey pile longest on front of dorsum; wings hyaline, fulvous at the extreme base; pterostigma brownish-ferruginous; membranule dark brown, white at base; legs black, unguiculi reddish-brown with an interior tooth just beyond the middle; abdomen very dark brassy-green almost black; the sides of segment 2 below the auricle, but not extending on to the genital lobe, reddish-brown; and above on either side an indistinct roundish spot of same color as in life; incisure between segments 2 and 3 reddish-brown, luteous in life; abdomen swollen at the base, segment 3 constricted, 4 with the sides equal, 5–7 with apex slightly broader than base, 8 equal, 9–10 with base slightly broader than apex, the 10th carinated; appendages black, superior pair short, cylindrical, nearly straight, slightly kneed outwards at the extreme base, curved slightly outwards at the apex, which is rounded, an internal sharp tooth and a minute infero-external one at the base, and a small inferior one in the middle, ciliated with long hairs interiorly; inferior appendage deeply cleft, the branches sub-compressed, vertically bifid, the apices pointed. 8 antecubitals; 7–8 postcubitals, two rows of discoidal areolets.

Length 1.75–1.85; alar expanse 2.4–2.48; pterostigma .09 in.; upper appendages .09 in. 2 ♂. Hermit Lake, August 11, 25.

Cordulia Walshii *nov. sp.*

♂ Vertex and occiput dark, sometimes a little brassy, brown (in life yellowish-brown); epistoma, sides and lower border of front dark, dull yellowish-brown (in life yellowish-brown); rhinarium and labium luteous (in life dirty yellow); labrum black; eyes in life green; thorax brassy-green (as in life) sometimes dulled with fuscous; dorsum in front tinged with faint dull ferruginous, as in life, not seen in the fuscous individual, mesothorax with an abbreviated stripe, metathorax with a central spot pale yellowish-brown (in life whitish with a tinge of yellowish-brown); between them, below the mesothoracic spiracle, an indistinct spot of yellowish-brown as in life; wings hyaline, the posterior pair slightly fulvescent next the membranule; pterostigma brownish ferruginous, membranule fuscous, whitish at the base; legs black, fore femora, except apex and inferior surface, yellowish-brown; claws of tarsi with a small interior tooth beyond the middle; abdomen very dark green, almost black, behind segment 4 covered with very short yellowish pile; the sides on segment 2 not extending on to genital lobes, a spot on side at base of segments 3–7, and apical third of dorsum of 10 reddish-brown (in life pale yellowish-brown); abdomen swollen at the base, segment 3 much constricted, beyond gradually swollen so as to be a little broader than the base at apex of 5, gradually narrowed again so as to be half as broad in middle of 8, widening again as gradually to the apex of abdomen, dorsum of base of segment 10 sub-carinated; appendages black, apex of superiors dull yellowish-brown, especially above, ciliate with very long yellowish-brown hairs near the apex except beneath, forming a brushlike termination to the appendages; superior pair rather long, depressed and compressed at the base, sub-cylindrical beyond; when viewed from the side slightly arched, when viewed from above directed outwards at the extreme base, and thence inwards so as to bring the apices together; at the extreme base a supero-internal tooth, on the basal third two infero-external teeth, swollen especially exteriorly before the apex, upon which swollen portion the whorl of long hairs is placed, the extreme apex produced to a sub-depressed triangularly pointed recurved and upcurved lamina; inferior appendage half as long as superior, triangular, apex blunt and furnished with a recurved unguiculus, the appendage supported upon either side at the base exteriorly with a short semicircular lamina. 6–9 antecubitals; 5–6 postcubitals; two rows of discoidal areolets.

Length 1.8; alar expanse 2.68–2.60; pterostigma .09 in.; superior appendages .14 in. 3 ♂. The Glen, White Mts. Aug. 20–28.

Cordulia elongata *nov. sp.*

Vertex and front except sides and on lower border brassy-green; sides and lower border of front brownish yellow (in life luteous); rhinarium and labium luteous, as in life; epistoma very dark brown or black, labrum black; occiput blackish, in the ♀ with ferruginous hairs posteriorly; eyes in life bright grass-green above, brownish-green below, a little spot of whitish in advance of the tubercle; thorax brassy-green (♂) or bronze-brown tinged with green especially on pleura (♀); a dull ferruginous spot on each side of dorsum anteriorly, pleura with a broad, straight, abbreviated mesothoracic stripe and an elongated metathoracic spot brownish-yellow (in life lemon-yellow, the anterior paler); wings hyaline, the ♀ sometimes with a smoky tinge about the nervures; pterostigma black; membranule fuscous, the base (sometimes the basal half) white; legs black, fore femora with a superior castaneous vitta; claws with a minute tooth beyond the middle; abdomen very dark bronze-green approaching to black, covered beyond segment 4 with greenish-gray short pile, segments 1–2 and base of 3 in ♀ very dark brown (in life yellowish-brown), 2–3 in ♂ greenish-black; on sides of segment 2 not extending in ♂ upon genital lobes, a large brownish-yellow spot (in life luteous); dorsum of segment 2 with a spot on either side at the apex indistinct, on 3 at the base distinct brownish-yellow (in life luteous); abdomen swollen at the base, much constricted in middle of segment 3, gradually widening so as to be nearly the width of the base at segment 6, which is equal, beyond this narrowing in a nearly similar degree (♂) or swollen at the base, behind which nearly equal; dorsum of segment 10 carinated above; appendages black, superior pair (♂) long, subcylindrical, ciliate except at the extreme apex, when viewed from above nearly straight; apical two-thirds approximate parallel; viewed from the side they appear slightly arched, the apex upcurved, pointed; there is a minute basal tooth directed downwards on the exterior margin, and just beyond it a larger one on the middle of the inferior surface, starting from which the inferior surface is subcarinated towards the interior edge before the curving of the apex; inferior pair a little more than half as long, shaped as in *Cordulia Walshii*; appendages of ♀ long, cylindrical, the apices very slightly curved outwards, pointed, constricted at the base. 8–9 antecubitals; 7–8 postcubitals; two rows of discoidal areolets, beyond, three.

Length 2.2–2.30; alar expanse 2.9–3.2; pterostigma .12; appendages ♂ .14, ♀ .16. 1 ♂, 3 ♀. White Mts. August.

Diplax rubicundula (Say,) Hagen.

I suppose by the "black band before the eyes" Hagen refers to a transverse band between the vertex and the front, i. e., an antennal band, since such a one is present in my specimens; but in other places he uses the same words where it refers to a band bordering the anterior inner edge of the eyes, as in some species of *Æschna*; my specimens differ from Hagen's description in the following particulars: the tips of the superior appendages in the ♂ are fuscous, the apex acute but not recurved, the superior edge being nearly straight, while the inferior is curved upwards somewhat; the median tooth beneath is denticulated anteriorly; the genital hamule has the apex bifid, the posterior branch triangular, bluntly pointed, longer than broad, the anterior branch forming an unguiculus which is one-third the length of the whole hamule, directed backwards and inclining in the least degree towards one another. 7–8 antecubitals; 6–9 postcubitals.

Length ♂ 1.34–1.40, ♀ 1.14; alar expanse 1.96–2.16 in.; pterostigma .08 in.; abdominal appendages ♂ .05 in. 5 ♂, 2 ♀. August, summit of Mt. Washington and also in the valley.

During life the whole of the front and mouth parts are pale yellowish-green, except the maxillæ and tips of mandibles and an antennal band, black; eyes dull ferruginous above, below tinged with olivaceous; dorsum of thorax olivaceous-brown (♂) or olivaceous-green, in less mature specimens dull brownish (♀); pleura tinged slightly with reddish, especially behind (♂) or yellowish-green, especially behind, in less mature specimens greenish above, yellowish below, merging into one another, with a brownish spot at base of hind legs (♀); abdomen either bright blood-red, except first segment, which is dark yellowish-brown with a blackish-brown transverse streak, lateral spots black, subdorsal spots faint yellowish-brown, on segment 3 amber, (♂) or dorsum blood-red, last segment tipped with yellowish, the transverse spots olivaceous; sides yellowish, olivaceous-green, the spots black, below the spots with a whitish pruinosity; beneath, segments 1–8 black, 9–10 yellowish-brown (♀) or in less mature specimens of ♀, light and bright olivaceous, segments reddish, the spots black.

I am inclined to consider as identical the species described by Hagen in his Synopsis as No. 1, the *assimilata* of Uhler and No. 6, the *rubicundula* of Say, with which *ambigua* of Rambur is placed as synonymous.

Through the courtesy of Mr. Uhler I have examined with considerable care, and at several different times, the specimens of both, which are found in his collection. The specimens of *assimilata* are the same as those used by him in his original description of that species, and they seem to differ in a very slight degree from all the specimens of *rubicundula* which I have seen, in the shape of the posterior genital hamule and the genital lobe of the ♂, and in the bifid portion of the vulvar lamina of the ♀; the former (*assimilata*) in the genital lobe of the ♂ is long and slender, nearly equal throughout; in the latter it is more triangular, much broader at base than at tip, the tip rounded; so, too, the posterior genital hamule is slenderer and less triangular in the former than in *rubicundula;* the hamules are less extruded in my specimens of the latter, than in those I have seen of the former, but this may be purely accidental; in the latter, the lobes of the bifid portion of the vulvar lamina of ♀ are separated from the base by a distinct, equal channel; each is sub-carinate, conical, pointed; in *assimi-*

lata they are separated by a channel more distinct toward the tip, so as nearly to hide the carination, the tips subdivaricate; but the parts vary so much in the specimens before me of *rubicundula* that I am inclined to think that a larger number of specimens of *assimilata* would show less constancy of character than the few I have examined possess, and bridge over the very narrow chasm which now seems to separate them. There are specimens of *rubicundula* too in Mr. Uhler's collection which have a more suffused amount of coloration upon the wings than some of his specimens of *assimilata* have.

But if there are two species here, the *rubicundula* of Say must be referred to the species described under that name by Hagen, and not to the *assimilata* of Uhler as argued by Walsh; the two species, if they be two, do not differ as Walsh states, in the color of the legs nor in size, they both agree perfectly well with the description of the norm as given by Say, of his *rubicundula;* though his description of the variety with discolored wings is more characteristic of *assimilata.* Now Harris received from Say specimens of his *rubicundula*, as will be seen by Say's description, and there are in the cabinet of Dr. Harris, specimens which are marked on his MS. catalogue as some of them received from Say and labelled *rubicundula* by him; there are four specimens marked so either by Say or Harris; three of these are plainly *vicina* of Hagen, but *vicina* of Hagen cannot be the *rubicundula* of Say, as a comparison of the description will show, for the abdomen of *vicina* has no lateral black vitta, and is not of so deep a color as sanguineous; the superior anal appendages of the ♂ have a tooth not on the inferior middle but much nearer the tip; it has only six or at most seven postcubitals instead of about nine; the remaining single specimen is probably that received from Say himself, and is the *rubicundula* and not the *assimilata* of Hagen, so that I am inclined to think Hagen and not Walsh, is right in the determination of the *locus* of Say's *rubicundula.* Of the truth of this determination Mr. Uhler, through whose kindness I have been permitted to examine considerable series of *rubicundula*, *assimilata* and *vicina*, some received from Messrs. Hagen and Walsh, is now persuaded, on a reëxamination of the specimens since he gave in his adhesion to Mr. Walsh's view; he is also inclined to doubt with me the propriety of separating the two as distinct species.

I do not think however that Hagen can be correct in referring the *L. ambigua* of Rambur to the *L. rubicundula* of Say, for the legs of *L. rubicundula* are not "jaunâtre" but blackish, and the whole particular description of these parts by Rambur is incorrect as applied to *rubicundula.* "Ailes sans tache jaune sensible à la base" is not true of *rubicundula*, all the wings in all specimens show some trace; the pterostigma is not "blanchâtre" at the extremities, but only paler.

Nor in these respects, save in the very last, will it apply any better to the specimens of *assimilata* before me. Nor can the description apply to *D. vicina* of Hagen, since the vulvar lamina of the ♀ is not bifid, as Rambur describes that of *L. ambigua* to be; it still remains to be seen, therefore, what the *L. ambigua* of Rambur is.

October 18, 1865.

The President in the chair.

Thirty members present.

Mr. A. Agassiz made a communication on the development of the Porcellanidæ, and exhibited drawings of the zoea of *Porcellana macrocheles* Gibbs, from Newport Harbor, R. I.

Dr. B. G. Wilder gave an account of a case of imperforate ear in an adult.

The possessor was a colored man named Lee Mallory, a private of Co. "D." 102d U. S. Colored Troops; 23 years old, stout of body but simple and at times feeble in mind. He has never had fits, but is liable to dizziness and pain in the head which is more severe behind the imperforate ear; from this there has never been a discharge, but from the left or open ear, there has been occasionally discharged a thick flaky yellowish fluid. He is quite deaf, hearing but poorly with one ear and not at all with the other.

The left ear is smaller than usual and wants the lobule, but is in other respects well-formed. The right ear is as long as the left but more narrow and consists only of the cartilage tightly covered by the skin; the lobule is wholly deficient; the fossa of the helix is not visible except as an oval depression where it should lie as if the helix were depressed upon the fossa and had coalesced with its floor. Tragus very small; antitragus present as a cartilage, but does not project. Concha well defined, though small, but presents no opening whatever, nor has there ever been one; a needle was pushed to the depth of half an inch through the integument where the meatus should be, but everywhere came in contact with a firm gristly substance. The upper margin of the ear is rounded as usual.

Just in front of the tragus is a small pedunculated papilla, about two lines in diameter. It has no connection with the ear itself, being freely movable with the integument; but this man says that his father and sister each have one imperforate ear, in front of which is just such a papilla. Taken by themselves. these three cases would be merely curiosities, but there are on record several cases where such or similar papillæ have accompanied an imperfect development of the ear. In Otto's "Monstrorum descriptio anatomica," Plate IV, Fig. 3, is represented a fœtus with a natural left ear, but small right ear, with several such papillæ in front of it and over the lower jaw; and Fig. 2 represents another fœtus in which the right ear was normal, but in place of the left was a large papilla, looking as if the meatus had been everted. I am informed by Prof. Wyman that there may be traced a series of abnormal appendages, from such simple papillæ as those described, at the one extreme, to a more or less completely formed fœtus at the other; so that the papillæ may be regarded as the minimum of development for a twin. The absence of the lobule in both ears is instructive, when it is remembered that this portion of the external ear is the last to appear in the development of the embryo, and that it is the first to disappear among the mammalia below man.

Prof. H. James Clark presented a paper "On the Vorticellidan parasite (*Trichodina pediculus* Ehr.) of Hydra." He remarked that in its healthy, unrestrained condition, *Trichodina* is very dissimilar from the hitherto published representations of it; that it has a deep, asymmetrical, cyathiform, or dice-box shape, with an irregular and longitudinally furrowed and plicated exterior; a greatly depressed cupuliform *disc*, along the margin of which a single, spiral row of vibratile cilia or "vibratory organ" is attached; that the so-called vestibular lash, or "bristle of Lachman," is an optical illusion arising from a foreshortened or edgewise view of the row of cilia at the mouth of, and within the vestibule; that the posterior, truncate end of the body is margined by a distinct, annular *velum*, immediately behind which, and arising from the same basis, is a complete circle of vibratory cilia; and finally that the so-called "adherent organ," or apparatus of hooks and *radii* consists, *firstly*, of a distinct, separate, annular border, of which the opposite faces are dissimilarly striated by perfectly straight, transverse ridges; *secondly*, of a complicated circle of separable hooks, which is applied to the posterior face of the striated, annular border, along its proximate edge; and *thirdly*, of a series of *I*-shaped *radii* which lie, one by one, opposite the several hooks, and converge toward the axis of the basal plane of the body.

Dr. J. C. White, in behalf of the Committee appointed to nominate a Curator of Herpetology, proposed the name of Dr. B. G. Wilder, who was duly elected.

The following gentlemen were elected Resident Members: Mr. W. F. Elston, Cambridge; Mr. Alexander Moore and Mr. Roger Wolcott of Boston.

November 1, 1865.

The President in the chair.

Forty-two members present.

Dr. C. T. Jackson gave an account of a scientific journey through California and Nevada, and exhibited to the Society two portfolios of sketches and photographic views by Vischer, a California artist, comprising admirable drawings of the "Big Trees" of Calaveras County (*Sequoia gigantea*), the height and circumference of the most remarkable ones having been measured by Joseph B. Meader and Dr. Jackson; also reduced photographic views, from larger sketches, of the Nevada scenery, drawn by Vischer, and views of mines and of mining machinery of California and Washoe.

The voyage from New York to Aspinwall, and railway transit to Panama, and voyage up the Pacific coast of America, were briefly described, with remarks on all the interesting observations made at sea and along the coast.

The distance across the Isthmus to Panama is fifty-nine miles, requiring three hours by railroad to make the transit. This route is of great interest to Northern people who have there an opportunity of seeing the luxuriant vegetation of a tropical region.

On the voyage from Panama to San Francisco the traveller has an opportunity of viewing the lofty ranges of mountains of Mexico, most of which are volcanic, and some of them active. The first stopping place is Acapulco, in Mexico, where the ship remains a few hours and the passengers are allowed to land. The isothermal lines crossing the Isthmus of Panama turn directly up the coast to the North, so that an equatorial heat reaches entirely to Acapulco, and hence all the tropical fruits abound there. The next stopping place was Mansanilla, which is the place of export for the silver from the Zacatecas and other silver mines of Mexico at the present time. Many millions of dollars' worth of silver in the form of bricks, are exported from that place. While in Mansanilla harbor Dr. Jackson had an opportunity of studying the habits of the large and voracious sharks which were very numerous. It is commonly believed that sharks turn over, bringing their mouths up under an object floating on the water when they seize it, but he observed, when the intestines of oxen were thrown over, that the sharks after playing around this food for at least five minutes, swimming cautiously all around it and viewing it carefully, finally darted suddenly at it and thrusting the nose out of the water and over the food, seized it, and never in any case turned over in the manner they have been supposed to do. The natives swim in the water while sharks are near, and do not seem to fear them, but they do not go so far from their boats as to prevent their returning to them if they see a shark has any intention of making an attack, and there is always time enough to escape, since the shark is so very cautious.

Arrived at San Francisco April 7th, he entered the harbor amid a heavy shower, which was the last rain of the season; and not a drop of water fell in California for four months afterwards. The dry season (our summer,) is the winter of California; drought takes the place of and is equivalent to, the cold of winter, giving to the vegetation a period of rest. Owing to the uniform north and north-westerly winds, which blow over San Francisco from Russian America during the dry season, the temperature of the place is generally from 60° to 65° F. during that season, and the current of cold water from the north setting into the bay of San Francisco adds to the coolness of the climate. From the name, Golden Gate, one is apt to form a brilliant conception of the entrance to the harbor of San Francisco, but it is really a dreary and chilly spot, remarkable chiefly for its cold fogs and innumerable sea lions.

After a few days' rest in San Francisco, Dr. Jackson, with three gentlemen from Boston, proceeded to the State of Nevada, examining on their way the celebrated gold mines (auriferous quartz veins) of Amidor County, California. The Sierra Nevada range of mountains, white with snow, with its serrated peaks, fully justifies the Spanish descriptive name which signifies a Saw of Snow. By the Placerville route the Sierra range was crossed at an elevation of 7,467 feet above tide water, sledges being substituted for wagons, the snow being about ten feet deep on the road. After crossing the mountains we descend into the mountain valley of Washoe mines district, and reach Virginia City, which is elevated 6,342 feet above the sea and is surrounded by snowy mountain peaks. Virginia City is a large and prosperous mining town, and owes its existence to the silver mines of the Comstock ledge of argentiferous quartz, which is extensively mined by many large and enterprising companies, yielding millions of dollars' worth of silver per annum. Only a short stop was made at Virginia City at this time by our party, for we were hastening on to the special scene of our labors in and near Austin. Descending upon a table-land plain, incrusted with carbonate of soda and sea salt, we travel for about one hundred and eighty miles over a scene of utter barrenness and desolation, on a plain upon which only sage brush grows. As we come near the foot of the Humboldt range of mountains, well characterized Trachyte, Trachyte Porphyry and Domite were seen to be the characteristic rocks of the ancient volcanic formation. Specimens were obtained from the land falls or slides from the mountains, which had reached nearly to the border of the plains, and the denuded sides of the mountains were seen to be composed of these rocks.

Approaching Austin we come to mountain ridges and rise above the level of Virginia City, when we enter the valley of Austin, where by barometrical measurement the centre of the town was found to be 6,489 feet above tide level, or 147 feet higher than Virginia City.

Austin is surrounded by three mountains separated by deep cañons; Lander Hill, Central Hill, and Union Hill are the names by which they are known. These hills consist of a granite made up of crystalline feldspar and mica without any aggregated crystals of quartz, though the rock is cut by an immense number of quartz veins containing the silver ores. The geological age of this rock is probably Triassic or Jurassic, since it is protruded through slate strata which, in California, has been proved by the existence of certain fossils to belong to that formation. Rich veins of ruby silver ore abound in this rock, and hundreds of mines have been opened for its extraction. At a future meeting, details with regard to some of these mines will be given.

Austin, surrounded with snow-capped mountains, has of course a cool climate, but since it is shut in by the mountains the valley is warm in the middle of the day. No farming is attempted, and all food is brought from Utah or San Francisco for the supply of the village. There are but a few spots where even a garden can be successfully cultivated in the town. Wood for fuel is brought from distant mountains by the Shoshone Indians, who retail loads of it in the streets. Excursions were made to mineral lands in Smoky Valley and to the Cortez District near Humboldt. Indian hostilities rendered travelling somewhat dangerous, but we did not happen to meet with any hostile bands.

Returning to San Francisco another mountain pass through the Sierra Range was chosen, called the Dutch pass, and we went through

Grass Valley, California, the richest quartz gold mining district of the State. Some days were spent at the gold mines of this town, and full examinations were made of the mills, and process employed in the extraction of the gold. We found Platner's chlorine process for extracting gold from poor ores, was used in working the auriferous pyrites concentrated from the tailings of the amalgamating mills. The village of Grass Valley is very beautiful, most of the cottages being surrounded with flowers; and the climate being very salubrious, people of leisure and taste are attracted to the spot, and the good hotels of the town are well patronized.

On the 4th of June, I made an examination of the acorns which the California red-headed woodpecker so abundantly inserts into holes made in the bark of the trees. Knowing that the bird is insectivorous I did not believe the common opinion that the acorns were eaten by woodpeckers. The acorns are always driven into the holes made to fit them, cup end foremost, so that the pointed end only is exposed to view. They are packed in so tightly that it is difficult to extract them without the aid of a knife. On getting out some of these acorns I found in them only the worm, which had eaten up the kernel of the nut. Thus it would appear that the woodpecker is able to select the infected acorn in which there is a minute and almost invisible egg and puts the acorn into a hole in such a manner as to prevent the escape of the worm when it comes to maturity; as the worm can only cut through the softer portion of the shell at its base and not through the hard pointed end, so it is securely imprisoned until the woodpecker calls for it. Since there must be a limit in time as to the procuring of the infected acorns, and to the existence of the worms in the nuts, and a sudden harvest of the worms would be obtained at a particular time in the year, it seems probable that these birds lay up this store of food for their young, which must require a large supply of animal food, for it has been shown by Dr. Treadwell that a young robin eats about its weight of worms per diem.

Although woodpeckers are not gregarious, living in pairs and not in flocks, they in this case, from necessity, have to act on community principles, for it would be difficult for any one of the birds to identify and defend his particular property, and the worm harvest must be open to the whole community. Here, then, we have a fine example of instructive *prévoyance* in birds and of provision made for their young. Every year millions of acorns are nicely packed into holes in the bark of trees and even in the wooden ceilings of the porticos of houses, where a crack enlarged is made capable of receiving an acorn. A lady told me that every morning during the acorn season it seemed as if a hundred carpenters were at work hammering in the veranda of her house, so loud were the strokes of the woodpecker's beak.

By authority of the Secretary of the Treasury, the U. S. steam cutter Shubrick was placed at the disposal of Dr. John Torrey for our voyage down the coast to Santa Barbara county, whither we went to make some general explorations of the country and to settle the vexed question as to the existence of petroleum springs in the mountains. While in bivouac near Mupu on the Ojai ranch, on Wednesday, July 12th, at 7.29 P. M., we were suddenly startled by a burst of intense light, and looking to the north-westward saw a magnificent meteorite passing through the heavens and toward the north-east. It left a long train of brilliant sparks and was itself of the apparent magnitude of a six-pound cannon ball. The time of its transit was eight seconds, while the illuminated train remained visible twelve minutes, and settled so slowly that I had ample time to measure its angle of elevation, by means of a clinometer, the only instrument, for the purpose, I had at hand. This angle I found to be 21° from the horizon. It was observed that the portion of the meteor's train which showed the largest sparks settled more rapidly toward the earth than its other parts, so that it formed a bow downwards in its middle. The train was observed to waver, as if from currents of air, and from all the phenomena, we think the atmosphere, where the meteorite passed, possessed some considerable density and powers of resistance. On returning to San Francisco, a notice of our observations regarding this meteorite was published in the mining and scientific press of that city, with memoranda of points, upon which information was desired, from other observers, to aid in the determination of the position of this remarkable object. In reply we soon obtained from the Grass Valley Union newspaper the observations made by a surveyor, who was on his way from Virginia City to Grass Valley, and was thirty miles south of Virginia City, Nevada, on the overland route, three hundred and fifty miles north of our point of observation. He saw the meteorite at the same time we did, and south-eastward of his point of observation and at an estimated angle of 20° above the horizon. Allowing his observation to be approximatively correct, we have for the height of the meteorite, by computation of the triangle with corrections for refraction and curvature of the earth, forty-five and a half miles; its distance from us, one hundred and eighty-two miles, and from him, one hundred and ninety miles, while the point on the surface of the earth directly under the meteorite was one hundred and sixty-nine and nine-tenths miles from us, and one hundred and seventy-eight and a half miles from him.

It is seldom that we can obtain even so imperfect data as the above for computation of a meteorite, since the observer, startled by so brilliant an apparition in the heavens, is not likely to think at once of the importance of observations to determine the position of the object.

Fortunately the long duration of the illuminated train gave ample time for reflection and for observations.

Dr. Jackson next gave a brief outline of the geology of California and Nevada, describing the cretaceous and tertiary rocks of the coast range of California, so remarkably metamorphosed, containing serpentine and other rocks heretofore supposed to belong to much older formations. He noticed the mercury mines of Almaden and the coal formation of the Mt. Diablo range which are in the cretaceous rocks, the petroleum springs of Santa Barbara and of Humboldt, which are in the tertiary strata, or between the cretaceous and tertiary, the asphaltum beds and veins, etc. He then described a geological section of the strata from the coast at San Francisco to the Cortez district, seventy miles west of Austin, Nevada, mentioning the remarkable elevations which he had measured barometrically along his line of section. He described the gold bearing rocks of Amidor county and Grass Valley, California, the copper mines of Calaveras county, Cal., and the silver mines of Virginia City, Nevada, and of Austin, Nevada, of which he said he should give detailed descriptions at some future meetings of the Society, when he hoped to present a series of specimens, now on their way to Boston via Cape Horn, which would fully illustrate the subject of the mines.

Mr. H. Mann said, in referring to some Hawaiian human crania and skeletons which were upon the table, that they were obtained near the beach beyond Diamond Hill on Oahu, about eight miles from Honolulu, in what is supposed to have been an old battle ground, the fight having been to oppose the landing of natives from another island. There were several places on or near beaches on different islands where there are great numbers of skeletons lying exposed in the sand. It is difficult, at this late day, to ascertain whether these are all battle-grounds, or if some of them may not have been burial places. The presence of the skulls and skeletons of females, and also of infants, would seem to favor the latter supposition, while the customs of the natives in not usually burying their dead in such places, and in such a manner, would be an objection. One place on Kauai near Koloa he mentioned especially as having a very large number of skeletons, including those of infants.

Mr. Mann then said a few words in regard to the volcano of Kilauea at the time of his visit in August, 1864, when it was in sluggish action, the lava lake being about three hundred feet in diameter, and the lava thirty or forty feet below the brink. At the time of his visit to the summit crater of Mauna Loa, there was no action, excepting in a few steam cracks. He pointed out the direction of the streams of lava which have issued from the sides of Mauna Loa since 1840, and spoke more especially of the one of 1859, which ran about fifty miles in nine days, before entering the sea. The channels through which the lava ran in this stream were, in places, at least seventy-five feet deep and often arched over. It was a question whether the whole stream was of this depth at any one time or if the lava had melted its channel part way into underlying beds of rock. He spoke of the aspect of Hualalai, which is covered with great numbers of small cones, each containing one or more pit craters. There is a singular "blow hole" on the summit of this mountain, of only about twenty-five feet in diameter, with more than a thousand feet of perpendicular depth, its cone being composed of the loose fragments of lava ejected in a viscid condition and thus adhering slightly when falling together. The inside of the shaft does not seem to be made of regular blocks as is usually the case, but is as smooth as if plastered over or turned out of plastic matter, showing, perhaps motion of the gases and other matters upon their axis on being ejected.

Dr. White drew attention to the remarkable differences presented by the teeth of the crania from the Hawaiian Islands, as compared with the dentition of the California Digger Indians, observed in the skulls presented by Dr. Thayer this evening. In the latter the crown of the teeth formed flat grinding surfaces, while in the teeth of the Sandwich Islanders the cusps were very perfect and the incisors and canines unusually large. He also noticed evidences of diseased action in several of the vertebræ belonging to one of the skeletons.

Mr. Mann referred to an article of food used by the Indians of the Yo Semite valley, consisting of the larva of a fly abounding in Lake Mono.

Prof. H. Y. Hind of Toronto, Canada, was elected a Corresponding member, and the following gentlemen Resident

Members:—W. M. Ogden, Dr. J. F. Frisbie; Messrs. E Bicknell, W. S. Whitwell, W. S. Chase, Alanson Tucker of Boston, and Mr. B. P. Mann of Concord, Mass.

November 15, 1865.

The President in the chair.

Forty-three members present.

Prof. H. James Clark made a communication on the vestibular bristle of Vorticellidæ.

The so-called "bristle of Lachman" is an *optical illusion.* Two rows of vibrating cilia may be traced from the stem of the vibrating organ of *Epistylis* (*E. galea* Ehr? and *E. grandis* Ehr?) into the aperture of, and to the very bottom of the vestibule. One of these rows of cilia lies on the right side and the other on the left side of the mesial line of the vestibule. The one on the left, in particular, has a very strong resemblance to a single lash or *bristle.* This arises from the peculiar mode of arrangement of the cilia. Outside of the vestibule they are extended in comparatively straight, parallel lines, but when they enter the body they curve upon themselves in such a way as to form collectively a sort of cylinder; so that the vestibule appears to be lined with a series of closely approximated rings or hoops. From whatever point of view, therefore—excepting when looking directly into its mouth—the vestibule is seen, the outline of its cylinder of cilia appears as a *single line*, vibrating more or less, according to the activity of the component elements. Inasmuch as these two rows of cilia are quite wide apart in Epistylis, there always appear to be two false bristles within the vestibule; but as a general thing the one on the right is very faint. In *Carchesium* (*C. polypinum* Ehr.) and *Vorticella* (*V. nebulifera* Ehr.) the two rows are so close together that very rarely more than one false bristle can be seen. In Trichodina (*T. pediculus* Ehr.), the vestibular cilia forms but one single continuous line, and in consequence of this there seems to be but one false bristle. In perfectly fresh specimens of all the above mentioned Vorticellidans the illusion is most marked, because the cilia vibrate so rapidly as to produce a mere line of light, or a sort of halo, not only within the vestibule, but along the whole periphery of the rotary organ; so that the light line, which is generally mistaken for a vibrating filament, or bristle, may be traced directly from the interior of the body to the outside, and thence continuously all around the disc.

Mr. Mann spoke of the denudation observed in the rocks of the Hawaiian Islands.

The west side of Hawaii is remarkable for its dryness, or rather its want of running surface streams, in contrast to the northeast side of the island. From Kawaihae along the whole western coast of the island around to Waiohinu, a distance of one hundred and fifteen miles, there is not a stream of water. At Waiohinu, a village near the southern point of the island, situated in a shallow valley, there is a small stream which takes its rise about ten miles from the sea in three large springs of water, but the stream is lost five miles before reaching the coast. In a direct line from Waiohinu to the volcano of Kilauea, and beyond, along the base of Mauna Loa, a distance of forty miles, there is not another stream. The character of this country, beginning again at Kawaihae, is, first, very barren from that point up the slopes of Mauna Kea and Hualalai; south of Hualalai and west of Mauna Loa, there is a heavily wooded region about ten miles in width, beginning at a distance of five miles from the coast. The rains are here frequent. Southwest of Mauna Loa, and for twenty miles westward from Waiohinu, the country is one vast bed of volcanic fragments, lying in low and undulating ridges, with a sparse and stunted vegetation. The summer rains seldom reach the coast in this direction. Southeast of Kilauea, in Puna, as well as in some of the tracts between Waiohinu and Kilauea, there is some forest land, but broken up by immense beds or streams of lava, either in the form of clinker beds, or the smoother "pahoihoi" of the native language. Where these are found all is barrenness. From a point just north of Kilauea, a point thirty or forty miles west of Hilo, heavily timbered land is again found which stretches north for forty miles around the base of Mauna Kea, in a belt twenty miles wide or thereabouts, beginning from three to five miles from the sea-coast.

This whole region is intersected by almost innumerable streams; going north by the road from Hilo to Laupohoehoe, there are sixty-five of these gulches to be crossed in a distance of thirty miles, many of them nearly or quite one thousand feet deep, with a raging stream at the bottom,— which all take their rise and receive their supplies from the swampy land throughout the forest.

Denudation takes place here very rapidly; the lavas being of a soft basaltic structure, often with layers of scoria interstratified with more compact masses, some of which exhibit the columnar structure of basalt very finely. A stream of water once getting a passage into these softer scoriaceous beds will fast undermine whatever more solid material there is above. Professor Dana, in the Geol. U. S. Expl. Exped., has well shown the different ages, in relation to one another, of the different mountains of the group, and this can not fail to attract any one's notice in the different degrees of denudation, i. e., in the difference of the sizes of the valleys formed in different mountains. In the western end or mountain of the island of Maui, this denudation is strikingly exhibited. We have here a conical mountain of nearly six thousand five hundred feet, thus rising to a height of about one thousand feet above the general level of the clouds,—remaining but a mere framework of what it originally was. Radiating in different directions towards the coast, are seven very large valleys, besides others smaller, which one may throw a stone into, severally, by walking less than a quarter of a mile. The valley of Wailuku, opening on the northeast side of the mountain, is three or four miles in diameter, both longitudinally and transversely, with a depth of six thousand feet, bounded on either side by nearly vertical walls which merely serve to shut it off from two other valleys of but little less size; one of which opens seven miles north and the other four miles south, while in places the separating walls are so thin that one can sit astride of them, one foot in one valley, and the other in another. A third valley opening twenty or more miles farther to the south actually cuts into Wailuku valley to so great an extent that in olden times the natives preferred to cross by the pass one or two thousand feet high rather than go around by the coast. The valley of Honakahau which opens on the opposite or west side of the island, cuts into the head of Wailuku valley also.

This is what we see on a conical peak. On the island of Oahu, which has a northern range of mountains, instead of a single peak, condensing the moisture of the clouds along its whole length, we have parallel valleys to the number of thirty or forty, on the southern slope. The northern side of the range, for thirty miles, is one stupendous cliff, from two to four thousand feet in almost perpendicular height. But again, at the western end of this range, where the mountains slope in three directions from the centre, the fourth being a cliff, we see, in a less marked manner, the features of West Maui. The southern range of Oahu also shows the same marks of denudation, the latter being governed by its shape, which combines a peak with a range on either hand.

On the island of Kauai, there are many grand features of scenery produced by the mode of denudation, which has, in several instances, excavated valleys two or three thousand feet deep, and from seven to fifteen miles long, very narrow and with abrupt sides, exhibiting every lava stream which flowed to form the island in the places where they are thus cut through. Hanapepe valley is the most striking of these long, deep and very narrow valleys, though the Waimea, Makaweli and Wainiha valleys, are each very large.

On the mountains of the group; i. e., Haleakala, on East Maui, Mauna Loa, Mouna Kea and Hualalai, on Hawaii, where volcanic action has been more recent, we fail to find any such systems of valleys though their sides are in some places slightly scored.

I think in some instances the position of the valleys is between streams of lava, but it is very probable that this has not always been a means of locating them.

Prof. J. Wyman gave an account of some irregularities noticeable in the cells of the hive bee. He had found the studies of Réaumur, on this subject, published one hundred and twenty-five years ago, more correct than those of some of the later observers, especially Lord Brougham, who have attempted to show that the cells are mathematically exact in their construction. Réaumur observed not only variations in the diameter of the cells, and breadth of the sides, but also in the terminal planes.

Dr. Wyman found that all the kinds of cells varied, the worker cells least, those of the drones more, and the honey cells greatly The variations of these last are easily noticed by all.

If ten worker cells, arranged in the same straight line, are measured through corresponding sides, and then two other series of the same number crossing the first line, the different measurements will sometimes be found to vary by the diameter of a cell, as the following measurements show:

Cell 1.	1st diameter	1.97 inch.
	2d "	2.06 "
	3d "	1.99 "
Cell 2.	1st diameter	1.93 "
	2d "	1.97 "
	3d "	2.00 "
Cell 3.	1st diameter	2.02 "
	2d "	2.09 "
	3d "	2.03 "

Cell 4.	1st diameter	. . . .	1.95 inch.
	2d "	. . . .	1.85 "
	3d "	. . . .	2.10 "

The diameter of an ordinary worker cell is about 0.20 inch.

This variation does not exceed a certain amount, and when existing in one portion of the cell is corrected in the other. The terminal planes of the worker cells are liable to a large variation in consequence of the cells on opposite sides of the comb not being in parallel lines; a slight deviation from parallelism tending to bring in a fourth side, in which case, the cell, instead of ending in three equal rhombs, ends in two rhombs and two hexagons. Lastly, the cells on the two sides may be so arranged, that instead of having their planes parallel, the apices of the angles of one cell correspond with, and are directed towards the sides or terminal planes of the other; in which case the end of the cell is sometimes flat, instead of being pyramidal, and the economy of wax is thus very much interfered with.

He found the irregularity just described, also extending through a large mass of drone cells. Casts and diagrams of the honey cells were also exhibited, showing their great irregularity in shape, size of the angles, thickness of the walls, and distribution of the wax in the construction of the cells.

Dr. White exhibited a preparation of the human arterial system, injected, dried and properly mounted by Mr. Ogden, which exhibited the system of vessels as a whole.

Prof. Wyman was reminded of the Harveian preparations in the Hunterian Museum in London, and in this connection drew attention to the great equality in the size and length of the arteries of the arms, as compared with those distributed to the lower extremities, well seen when thus dissected out; showing how the two systems of branches thus repeated each other. A study of the whole system thus exhibited, was of aid in simplifying our knowledge of the morphology of the arterial system. Thus the intercostal arteries branching off from the aorta, were repeated in the lumbar and iliac arteries, as could be demonstrated by studying the same arteries in the fishes and reptiles, where they are nearly identical in size and form, and thrown off at regular intervals along the course of the main trunk.

The President read a letter from the Trustees of the Boston City Library, extending to all the members of the Society the privilege of using the Library. It was voted that the thanks of the Society be given to the Trustees of the Library for their courtesy.

Prof. H. Y. Hind of Toronto, Canada, was elected a Corresponding Member, and the following gentlemen elected Resident Members :—Dr. William Ingalls of Boston, and Mr. Henry W. Fuller of Roxbury.

Dec. 6, 1865.

The President in the chair.

Forty-two members present.

The following papers were read :—

ACCOUNT OF AN EARTHQUAKE AT SAN FRANCISCO, CAL., OCT. 8, 1865. BY PROF. WM. P. BLAKE.

An earthquake of unusual violence, sufficient to crack and injure many of the buildings in San Francisco, was experienced in this region, on the 8th of October last, at sixteen minutes before one o'clock, P. M. There were two distinct shocks, or periods of agitation, from five to ten seconds long, separated by an interval of perhaps five seconds. I was in Oakland, sitting at a table, and the first shock seemed to be a rapid, vertical, or jarring motion; the next, after an interval of a few seconds, was more lateral and wave-like, and seemed to be along a northeast and southwest line. The cottage rocked so violently that it seemed as if the plastering must fall, and we all ran out in fear. The shock in San Francisco was perhaps more violent. Some of the heavy buildings were badly cracked, walls were loosened from the timbers of the floors, and firewalls and cornices were thrown down. The front wall of a new four story building, on Third Street, was thrown down, while the side walls remained uninjured. In some of the streets there was a great destruction of window glass. No lives are known to have been lost. There are many interesting facts which seem to show the extent and direction of the movement in some places, but they are so conflicting as to be unsatisfactory. Water standing in tubs, pails and bowls, was partially thrown out; and in the philosophical instrument shop of Mr. Roach, a barometer tube, filled, and hanging by a string, was swung forwards and sideways so as to catch upon a projection three inches from the wall. Many articles were thrown over towards the west. It is generally conceded that the shocks were less violent on the hills than in the lower parts of the city. It would seem, also, that the high, brick buildings bent and vibrated under the motion, and were perhaps less injured in general, than the more solid and unyielding structures. The shot tower was distinctly seen to sway back and forth several feet.

The earthquake was felt at about the same time, and in the same, or even greater force at Santa Cruz, Watronsville, and San José. Northwards, we have, as yet, no record of its effects beyond Sacramento, Petaluma, and Tomales Bay; eastward it does not appear to have extended beyond the foot hills of the Sierra Nevada. It was not felt at Grass Valley, in Nevada County, and at Sacramento the shock was not heavy. It was felt at Stockton in considerable force, but it did not extend to Los Angeles. It was noted at sea, about twenty-five miles from land between Monterey and San Francisco. It thus appears to have been comparatively local, and confined to the Coast Mountains and the central part of the great Sacramento Valley.

Additional shocks were noted in the evening, one of them about ten o'clock being quite strong, and one the next day at twenty-five minutes of eleven, shook the buildings again in a disagreeable way. Over eleven distinct shocks were reported from Santa Cruz, and they have continued at intervals up to this time. On the 15th, there was a third or fourth strong shaking.

It is worthy of note that recent accounts from Portland, Oregon, show that Mt. Hood is in a state of eruption, but we have no important particulars. On the 9th of September last, when at the Muttole Valley, Humboldt County, I noted a very peculiar, sharp, lateral shock, apparently from the northwest. A severe shock was experienced at Fort Humboldt and Eureka, on Sunday, Oct. 1, which threw down nearly all the chimneys, and did other damage. It would thus appear that we have a season of unusual earthquake activity. Even so late as this morning, shocks were noted in San Francisco, but were so slight as not to be generally observed.

The extremely local character of an earthquake of such violence is to me an interesting and suggestive fact, and I shall endeavor to ascertain its geographical range with more precision.

Preliminary Notice of some Opinions concerning the mode of Elevation of Continental Masses. By N. S. Shaler.

The following notice presents a brief summary of some views as to the nature of the forces by which continents have been elevated, which were presented in a course of University Lectures delivered at

Cambridge, Mass., in the autumn of 1865. Only a preliminary statement is meant to be given of views which the author will hereafter endeavor to establish, by adducing the phenomena which have led to their adoption.

We are indebted to the simultaneous thought of Charles Babbage and Sir J. Herschel for the following conclusions concerning the effect of movement of the isogeothermal lines, and the causes competent to produce such movement.

1st. That the isogeothermal lines, at least in those regions near the surface, have their position determined by the thickness and conducting power of the materials constituting the solid crust; and that any considerable increment of non-conducting material at any point on the surface, would result in changing the position of the isogeothermals, bringing the lines of equal heat nearer the original surface.

2d. That by this means the lines representing the points of equal heat must be constantly rising in those portions of the earth's crust exterior to which deposition of strata is taking place, and that such an accession of heat into previously unheated strata must produce a great expansion of their mass; and as a consequence, we may have a considerable vertical uplift of the outer surface of the crust. These theoretical speculations are adduced by Mr. Babbage to account for observed phenomena of local elevation.

Accepting these conclusions as to the effect exercised on the movement of lines of heat by deposition, and the effect of such intruding heat in expanding the ordinary materials composing strata, it is at once evident that such expansion must act horizontally as well as vertically, producing a tendency to lateral as well as perpendicular movement. On consideration it will be manifest that the result of this lateral expansion, from the great elevation of temperature of the lower portion of the solid crust, would be a tendency of the whole area over which deposition was going on, to curve downwards. For the sake of illustration, this tendency may be advantageously compared to the movement resulting from the application of heat to a bar composed of two strips of metals having different coefficients of expansion; the resulting flexure is always in the direction of the material having the greatest rate of expansion. In the case of the earth's crust, the same effect, produced in the metallic bar by different rates of expansion, is brought about by different amounts of heat received by the upper and lower parts of the crust, from the change of position of the isogeothermal lines. While the deposition of one mile of vertical depth of strata at any given point on the earth's surface would not affect the heat of the crust near the surface, to such an extent as to produce any considerable expansion, the effect on deeper portions would be very considerable.

The same reasoning which leads us to conclude that over sea bottoms where deposition is going on there is a tendency to subsidence, leads us to the opposite conclusion with regard to those portions of the earth's crust which are above the water level, and over which degradation is taking place. This removal of material which is going on every where over the surface of the subaerial portions of the crust, must result in driving the isogeothermal lines toward the centre, in the gradual cooling of beds previously heated, and in the addition to the lower portions of the crust, of solid material gained from the viscidly fluid nucleus as the downward cooling progresses. These changes would evidently result in giving to such regions of the crust a tendency to bend upward, or in the reverse direction, from a similar movement of the ocean floor.

The process of accommodation of the hardened outer crust to the nucleus diminishing from loss of heat, requires the formation of ridges and valleys which will occur in such places, and of such size as the condition of the crust determines. Let us suppose that during any geological period the earth has parted with sufficient heat to require a readjustment of the crust to the reduced nucleus. At what point will the upfold take place and where the downfold? Manifestly at those points where there exists some tension acting in those directions. Such tension we have seen is given to the crust by the actions of degradation and deposition, and it follows therefore that when readjustment of the crust to the nucleus takes place, the resulting flexures will be upward over the subaerial portion of the crust, and downward over the subaqueous portion. This action will necessarily be complicated by the operation of other causes than that mentioned; the transfer of weight from one portion to another of a comparatively rigid crust, would necessarily tend to produce similar results on the direction of flexure. The most prominent effect of this transfer of weight would be a tendency to produce fractures extending through the crust at points near the shore line. Such fractures would extend through the superincumbent strata into beds which had been greatly heated by the deposition of the mass which had produced the fracture, and the result would be the formation of vents for the pent up gases of the heated strata, along shore lines, presenting the series of phenomena we have exhibited in volcanic fissures.

Assuming the original nuclei of the continents, or the points first elevated above the sea level, to have been in the northern portion of the existing continents, a view which it would not be difficult to show to be eminently probable, it is believed that continents would increase southwardly in a succession of southward pointing triangles through the action of the before mentioned causes.

Dr. C. T. Jackson exhibited an additional Emery mineral, *Diasphore*, from Chester, Mass., which was first identified by Prof. U. T. Shepard of Amherst College.

Dr. Penio exhibited drawings of a gland-like body, situated on the right thigh of a negro, aged 40 years, living at Charleston, S. C. This gland was situated over the "tensor vaginæ femoris" muscle, and in feeling and consistence, size and appearance, together with the nipple, the centre of which was depressed, strongly resembled the female mamma.

Dr. B. G. Wilder made some additional observations on the habits of the young, while in confinement, of *Nephila plumipes*.

Mr. A. Agassiz made a communication on the development of *Limulus*, and exhibited drawings of the young.

Mr. Putman made some remarks on the ichthyological fauna of the Great Lakes, as exhibited by the collection of fishes which he had recently made at Lake Erie, and which confirmed his previously expressed opinion that there was only one fauna in the Great Lakes, and that Lake Champlain belonged to it. At a future time he should offer a paper embodying the results of his investigations.

He also exhibited specimens of the Whitefish of the Lakes (*Coregonus*), and remarked upon the great variability of the species. He had had an opportunity of examining several thousand fresh specimens and was surprised to see the marked differences in form and proportion between young and adult individuals, males and females, and even of individuals of the same age and sex. In another species of the genus, called "Herring" at Lake Erie, this individual variation was considerable, but still not so great as in the Whitefish.

He said that the number of Whitefish had not apparently diminished in that part of the Lake where he had been (Kelly's Island), though for several years past thousands had been taken each year. This he had reason to think was due to the mode of fishing for them in "pounds," from which the smaller specimens were enabled to escape, and owing to the large number crowded together, the spawn and milt was pressed out, and the eggs falling through the interstices of the net were impregnated and developed.

The Trout had become quite rare in Lake Erie and the Muskallonge was now only occasionally taken.

In this connection, Mr. Lyman remarked on the destructive method of taking Salmon on the coast of Scotland by similarly constructed pounds.

The Secretary read the following letters:

From the Linnæan Society of London, October 2d, 1865; the Asiatic Society, Calcutta, October 13th, 1865; the Entomological Society of London, November 3d, 1865; the Institute Impérial de France, November 23d, 1865; the Albany Institute, and the Museum of Comparative Zoölogy, Cambridge, Mass., November 28th, 1865, acknowledging the receipts of the Society's publications; the Verein für Vaterländische Naturkunde in Württemberg, October 31st, 1865; the Naturwissenschaftlicher Verein des Harzes, Blankenburg; the Naturforschende Gesellschaft in Emden, and the I. R. Accademia di Scienze, Letere ed Arti di Padova, acknowledging the same and presenting their own publications; the Royal Geographical Society of London, October 31st, 1865; and the Naturforschende Gesellschaft in Danzig, November 1st, 1865, presenting their publications; and from M. Guillemot, Père, La Rochelle, France, December 6th, 1865, desiring to exchange specimens.

The following gentlemen were elected Corresponding Members:—Messrs. Eugene M. Riotte, Austin, Nevada, Joseph B. Meader, Stockton, Cal., Leander Ransom, San Francisco, Cal., Louis Janin, Jr., Virginia City, Nevada, Dr. Hermann Behr, San Francisco, Cal. Mr. Andrew Hayes of Roxbury was elected a Resident Member.

December 20, 1865.

The President in the chair.

Forty-three members present.

ON THE PLEISTOCENE GLACIAL CLIMATE OF EUROPE. BY PROF. H. D. ROGERS, LL.D.

I avail myself of this opportunity to submit to this Society a theory of mine in explanation of the Pleistocene Cold or Glacial Climate of Europe, its sudden coming in and departure.

All geologists who have studied the phenomena of the later Tertiary Ages, admit that there was an abnormally cold or very *snowy* era, in certain parts of our earth's surface, about the end of the Pleistocene Period.

The indications from organic remains, and the physical movements and impressions, all concur to prove that this refrigeration of the surface, late in the "Great Tertiary Day," was local and not world-wide.

No satisfactory evidence has yet been adduced to show that this chilling of our world's climate was *cosmical* or general, while all the testimony I have been able to examine, convinces me that it was essentially *geographical*, and intimately connected with, or dependent on, special conditions in the distribution of the waters and the claylands of the period.

Astronomy, in fact, all physical science, refuses to explain, or indeed to accept the notion of a general terrestrial, somewhat abrupt, cooling and subsequent heaving up. They fail to suggest any competent *cause* as much as geology refuses to produce any acceptable *proofs*. I wish to abstain, *in toto*, at present, from all discussion of this question, partly because I conceive that it befits more a Society of Physicists than one of Naturalists.

The phenomena I wish to account for are *local* upon our earth, though of wide geographic distribution, and I hold it to be far more philosophic to seek for their solution in geographical facts and laws, than in hypotheses, which invoke an appeal to agencies in nature, far beyond and without the pale of the appearances to be explained. I prefer to try to elucidate geographical phases in geology by reference to geographical causation.

Waiving the much mooted topics of Diluvial and Glacial action, I propose to restrict myself to a description of certain admitted geological facts connected with the most superficial deposits of Great Britain, indicative of a cold or icy period: and to a statement of other facts recently collected by me, which I think plainly indicate how that cold state of the surface was produced.

During the last few years evidence has been rapidly accumulating in England and Scotland, especially in the latter country, through the researches of zealous naturalists, that the organic remains of the most superficial deposits, more particularly those of the "Brick Clays" and their associated "Sandy Silts," which skirt both the eastern and western margins of the Island, like a narrow selvage, and occupy the beds and borders of its many bays and broad inlets, always *at* or only very little above the existing sea-land, are all of them of a more or less cold or Arctic type. Mr. Smith of Jondon Hill, and Rev. Henry W. Croskey, both of them diligent and successful collectors, have thoroughly established the Arctic and sub-Arctic character of the great majority of the many species they and others have collected and identified. A number of the Mollusca are of species still living, only they frequent no longer the British Seas, but frequent the waters of the Baltic, or even the Arctic Sea.

Mr. Croskey has established this very interesting general fact, that of these Pleistocene Fossils, those of the eastern side of Scotland, and of England too, betoken an essentially cooler aquatic climate than do those of the western or Atlantic side.

Before the announcement of this important deduction, I had expressed my conviction more than once, at Sessions of the Philosophical Society of Glasgow, where this fact of a difference of temperature was first made public, that we must seek the *cause* or origin of this refrigeration of the ancient coasts of Scotland in the physical geography of the regions separating Scandinavia from Russia. I grew impatient to procure authentic information respecting the Isthmus of Finland, which now links together those two countries, for I had become persuaded that all the phenomena of the Arctic Temperature of the Pleistocene Clay-period seemed plainly to imply that the frigid waters of the Arctic Ocean had access at that time to the British shores through the wide valley of the Baltic, and the low, flat plain, now the neck of Finland. I was aware, as every person at all versed in European geography should be, that the district separating the Gulf of Finland from the Southern bays of the "White Sea," is flat and watery, and of only moderate elevation, with no ridge of hills passing through it as a water-shed; but I was unable to authenticate this belief by inspection of any accessible trustworthy geographical materials.

In this state of suspense and uncertainty I therefore sent to the Governor of Finland, Baron Rokasoski, a letter explanatory of my conjectures and wants, with a list of interrogations. I was soon after in receipt of two admirable orographic charts of Finland, carefully annotated by C. Gülden, the government geographer, and quickly after, a letter from the same excellent authority, in full and satisfactory reply to all my questions.

The information embodied in this letter and the charts, is to this effect. The wide Isthmus dividing the Gulf of Finland from the White Sea is *low, very flat* and *marshy*, and *nowhere* elevated above the Baltic as much as two hundred English feet. For ages past there has been a tradition familiar to the Finland peasantry and fishermen, that their country was once *an island*, and their ancient name for it is the "Island of Finland." Moreover, they and the more enlightened inhabitants have always believed and asserted that the land is, and has been steadily and perceptibly slowly rising higher and higher above the sea-level. The letter assures me that critical surveys conducted for a long while past, prove, that while the dry-land near the mouth of the Gulf of Finland, is, and has been rising at the rate of two feet per century, that near Lake Ladoga is lifting at the rate of four feet, and all the surface further north than this at the still swifter pace of five English feet each century.

These data are in strict accord with all that we have been long ago taught of the gradual rising of all the west coast of Scandinavia, for one thousand miles from near Stockholm in Southern Sweden, to North Cape in Lapland, at rates augmenting as we go north, and being in high latitudes in Norway as rapid as three feet English, per century.

Such satisfactory confirmations of my theory have been very gratifying to me. Supposing the wide neck of land centrally occupied by Lake Onega, has been rising in the past no faster than at present, we go back only forty centuries, or four thousand years, to a state of the surface, at which the Arctic Ocean and the North Sea of Britain, were joined by an enormous marine strait or channel, wider than the present Baltic, and stretching from the White Sea of Archangel, southwestward, across Finland and over Southern Sweden, all Denmark and Holland, into the North Sea. Going a little farther back in time, to, say more than six thousand years ago, or to an epoch just antecedent to the generally supposed first appearance of mankind upon our earth, and we are in conditions of the physical geography of Western Europe which quadrate admirably with all the geological relics yet gathered of the immediately Prehuman Period.

Judging from the existing very flat and low profile of all the district bordering the Baltic, and assumed by me to have been flooded by the great northeast Arctic current, I infer that its average breadth was little less than four hundred miles.

I deem it superfluous to attempt any detailed explanation of the influences such a vast broad stream of icy and ice-floating Arctic water would possess in promoting a southward distribution of Northern plants and animals, and a very abnormal precipitation of snow in the Alps, and on many of the lofty mountain tracts of Europe. We need but turn and gaze to the refrigerating and glacier-making agencies of the North American Arctic currents, to interpret at once the chilling and snow-producing powers of this assumed outpouring of the Arctic Sea through the Baltic against France and Britain.

If space permitted, I could cite many instances of the far conveyance of huge, angular blocks, of various mineral composition, to localities where all geologists who have beheld them have been constrained to assert that they could have reached the points where they lie by no conceivable agency but that of floating ice. Murchison speaks of one such case of groups of large rocky masses lying at the foot of the Valdai Hills in Russia, some seven hundred miles from their ascertainable source in Northern Sweden, or perhaps Lapland.

I can add that I am familiar with the frequent occurrence of large sharply angular, wholly unworn blocks of stone imbedded in the fine grained brick-clay of the Clyde Valley in Scotland, resting in the undisturbed clay, and environed by fragile fossils, bearing no marks of any commotion in the waters, and amid all the signs and proofs of their having been freighted to where they rest, by ice rafts, and let gently down into the clay by the gradual melting of the stranded ice.

Dr. C. T. Jackson fully concurred with the observations of Prof. Rogers concerning the causes of the drift scratches, stating that there was no proof of their radiating from mountain groups of small extent in North America. In the State of Maine he had observed that the scratches run *around* the sides of the mountains, and were deflected into the valleys, on the principle that the angle of reflection is equal to the angle of incidence. In Rhode Island he had noticed boulders containing iron ore that could only have come from Cumberland of that State, which were scattered on both sides of the Providence River; that they diminished in size towards the south, and had evidently been rolled and pushed forwards by strong aqueous currents. He had lately seen how greatly the climate of a country could be lowered by cold northern currents during his visit to the coast of California The coast about San Francisco was chilled by the arctic current flowing southward from Russian America, for while one hundred miles in the interior the thermometer ranged from 105° to 110° during the summer, the same days in San Francisco it stood at 54°—65°. The temperature was thus locally lowered by the arctic currents impinging on this point. But four hundred miles southward, where Point Conception deflects the arctic currents from Santa Barbara and Los Angeles, he had experienced the midsummer temperature of Naples.

He said the rocks of the northern part of the country were scratched and polished by the action of grounded icebergs, and that the scratching and polishing could not be accounted for by the glacial theory. Sir John Richardson had mentioned to him that nowhere on the northern shores of the American Continent and on the Arctic shores of Siberia, were to be found any glaciers, or proper climatic or topographical conditions for the existence of glaciers, as nowhere in these limits did groups of mountains rise from warm valleys high enough to reach the snow line.

Dr. Jackson also referred to beds of clay sixty feet in thickness on Block Island, on the coast of Rhode Island, which contained perfectly sharp and angular boulders of a peculiar granite, which he had traced to their origin in Kingston, R. I., fifteen miles in a northeast direction.

Dr. B. S. Wilder exhibited a kitten with extra toes upon both fore and hind feet, which he considered instances of vegetative repetition ; and remarked upon the fallacy of drawing morphological conclusions from parts so variable in quantity, and so subject to teleological modifications as the distal extremities of the limbs.

Prof. Wyman stated that when parts are doubled at the ends of limbs, the supernumerary parts did not generally repeat those of the same, but of the opposite side. There exist many instances of partial doubling of hands and feet, and even of fore arm and arm, the two portions standing in relation to each other as right and left parts. When, however, an additional little finger or toe was developed, these do not conform to this rule and are often quite irregular.

Drs. J. B. S. Jackson and H. R. Storer in this connection gave instances of abnornal features transmitted by inheritance, and the President added several, showing that in such cases the primitive germ was doubled, that the spinal cord and other parts were split down and co-ordinated in their development, which then proceeded as harmoniously as the normal growth of the two halves of the body.

Mr. F. W. Putnam made a few remarks on an Indian grave which was found in September last, on Winter Island, Salem, by the workmen engaged in making the embankment of Fort Pickering. The grave was situated on a ledge, and made by placing a few stones about two feet from an abrupt ridge of the ledge, and resting other stones from them to the ledge. In this grave were found a stone chisel, ten stone arrow heads, a thin oval stone with two holes in it, an oval stone used probably in dressing skins of animals for clothing, several fragments of an oval shaped pot about fourteen inches long, ten wide and four deep, made of soap-stone, and having a knob or handle at each end, a piece of pure red ochre, a portion of a scapula and two bones of the foot of a cow, and a pre-molar tooth of a hog. There was also a quantity of bone dust and considerable colored earth, probably colored by the ochre.

Messrs. J. I. Hale, Jr., and George W. Swett were elected Resident Members.

DONATIONS TO THE MUSEUM FOR THE QUARTER ENDING DECEMBER 31, 1865.

Oct. 4. A specimen of *Julus*, from E. Stoughton, Mass., by Mr. Asa Brett; *Diaphomera femorata* ♀ from Winchester, Mass., by Mr. S. D. Clarke; Jaws of a shark, a species of Bat, *Pteropus*, known as the "Flying Fox" in Madras; six specimens of fish, specimens of clay iron stone from Madras, four hundred and fifty land and marine shells from Southern India and the Indo-Chinese Peninsula, by W. H. Dall; *Sorex platyrhinus*, a litter of young field mice, *Eutainia sertalis*, *Storeria occipito-maculata*, *Ambystoma punctata*, *Plethodon erythronota*, *Rana*, *Helix albolabris*. *Tebennophorus carolinensis* from Brunswick, Me., and *Pholas crispata* from Casco Bay, by Dr. A. S. Packard, Jr.; specimens of Lava, from Kilauea volcano, Sandwich Islands, twenty-two species of Achatinella from the Sandwich Islands: *Metaptera alata* from the Genesee river, Rochester, N. Y., by Dr. Alonzo Chapin.

Oct. 18. *Ambystoma punctata* from South Dedham, by Mr. M. D. White; specimens of Aphis from Chelsea, by Dr. A. A. Gould; Eggs of an insect deposited on a sprig of the oak, Norfolk, Va., by Dr. C. G. Greene; Seed vessels of *Bignonia*, etc., exotic shells (two hundred specimens), some minerals, and the lower jaw of a porpoise, by Dr. A. Coolidge; specimen of fossil wood from near Washington, D. C., by Dr. J. F. Frisbie; *Limophora flabellata*, by Mr. C. G. Bush; a mole from near Washington, D. C., and young flying squirrels from Burkville Junction, Va., by A. S. Packard, Jr.; four hundred specimens of Helices and marine shells from Lyme Regis, one hundred specimens of fossils from the Lias, from Lyme Regis, thirty specimens of Minerals from mines in Cornwall, England, by Dr. H. Bryant; Skull of a camel brought from New Orleans, La., by Boston Milling and Manufacturing Company.

Nov. 1. Specimens of fish from California, which are caught in large quantities and dried and eaten by the Wokopee Indians, three specimens of Coleoptera collected near the Dalles of the Columbia river, ten specimens of scorpions from Panama, S. A., Insects, mostly Coleopterous, from Acapulco and Manzanilla, Mexico, a Crustacean from Manzanilla, a collection of upwards of three hundred insects, and the embryo of a bird from San Francisco, Cal., by Mr. Samuel Hubbard; thirty-five specimens of insects, Fungi, specimens of diatomaceous deposits from Hartt's Location, including three slides of mounted specimens, and from the summit of Mount Crawford, N. H., by Dr. S. A. Bemis; *Trepidolepis undulatus*, *Scincus fasciatus*, *Coronella getula*, *Plethodon glutinosa* and *P. erythronota*, *Rana* two species, six other species of snakes and *Cambarus Bartoni?* from Danville, Va., by A. S. Packard, Jr.; two native skeletons and five skulls from the Hawaiian Islands, by Mr. H. Mann; Skull of an Indian from Mendocino Co., Cal., by Dr. Thayer; specimen of Specular Oxide of Iron from the Hudson River, N. Y., by Mr. Charles T. White.

Nov. 15. *Leda truncata* from the clay beds of Kennebunk, Me., by Mr. Frederic Ware; Fossil shells from the banks of the Rapidan near Fredericksburg, Va., by A. S. Packard, Jr.; Tertiary (Miocene) shells of the following species; *Turritella plebeja* Say? *T. Mortoni* Conrad, *Scapharca idonea*, *Dentalium attenuatum* Say, *Mercenaria febrica* Conrad, etc., from St. Mary's River, Md., by Dr. J. F. Frisbie; Preparation exhibiting the entire human arterial system, prepared and mounted by Mr. W. M. Ogden.

Dec. 6. A human cranium (young), by Dr. B. Joy Jeffries; Chrysalids of a Sphinx from South Dedham, Mass., by Mr. N. B. White; Skull and some bones of an Esquimaux from Hopedale, Labrador, and skull of an Otter from Straits of Belle Isle, Labrador; sections of a "Lignum vitæ" tree; Leaves and cones of *Pinus banksianus* from the Traveller Mountain in Northern Maine, by A. S. Packard, Jr.; supposed footprints and fossils in sandstone, Salamanca, N. Y., presented by Mr. T. G. Bancroft; a Double Rose with green leaf-like petals, by Dr Charles Pickering; Intestinal worm taken from *Leuciscus pulchellus* Storer, at Lake Parmachene, Maine, by Mr. F. G. Sanborn.

January 3, 1866.

The President in the chair

Forty-two members present.

The following papers were read:—

A List of Birds from Porto Rico presented to the Smithsonian Institution, by Messrs. Robert Swift and George Latimer, with descriptions of new species or varieties. By Henry Bryant, M. D.

The collections of Birds presented by Mr. Swift and Mr. Latimer are very interesting, as affording additional proof of the fact that most of the West India Islands possess peculiar forms generally recognized by ornithologists as species, but which it seems to me more rational, in many instances, to consider as local forms or varieties, the limits of which are more sharply defined than in continental ones, precisely as the boundaries of the region they inhabit are more distinctly marked.

Falco.

Tinnunculus.

Falco dominicensis Gmel. Several specimens of a small hawk, presenting no very appreciable character by which it can be distinguished from this species. One of the principal characters of the Linnæan genus *Falco* is the variety in plumage presented by the different individuals of the same species, and in none of those with which I am acquainted is this carried to a greater extreme than in the present. During a short visit to Cuba in the spring of 1863, I examined a very large number of individuals, and was unable even to form an opinion as to what should be considered its normal type of coloration, so unlike each other were the numerous specimens procured by me.

Tyrannus.

Tyrannus.

Tyrannus dominicensis Gmel. Several specimens.

Pitangus.

Tyrannus Taylori Sclater. Several specimens.

Myiarchus.

Tyrannus antillarum. Several specimens. This species? does not resemble particularly any other known to me. I presume it is the same referred to in Taylor's list, and not unlikely the same as the Tobago Bird in Jardine's catalogue of the birds of that Island. Its most striking character is the almost total absence of rufous in the tail.

No. 36,459. Length of dried skin, 170 *mm.**; wing from flexure 86½; tail 68; tarsus 21; middle toe and claw 19; claw alone 7; bill along ridge 21; 4th primary longest, 1st, 7th, 2d, slightly shorter than 4th.

Head above fuliginous-brown; hind-neck, back and scapulars dull, dirty, olivaceous-brown, becoming paler on the rump and somewhat rufous on the upper tail coverts. Wing dark brown, the middle and greater coverts broadly margined with dull whitish faintly tinged with rufous-olive, and with all the remiges, except perhaps the first, margined externally with paler, most distinctly so on the inner secondaries where the color is nearly similar to that of the border of the greater coverts; this color is gradually shaded into quite distinct rufous on the

* Measurements in millimetres.

primaries, brightest next their base. Tail dark brown, all the feathers obscurely tipped as if faded, the outer web of the outer feathers much lighter and margined with whitish most distinctly towards the base, as if weathered. Beneath whitish, slightly ashy on the throat, more distinctly so on the chest and flanks, and with a faint tinge of yellow on the abdomen and crissum, under surface of wings showing a pretty broad border of pale rufous on the inner margin of the primaries; axillaries and under wing coverts pale yellow, much brighter than the abdomen. Under surface of tail hoary brown, the inner web of most of the feathers with a small spot of pale rufous near the tip; bill, tarsi and toes dark blackish-brown.

Todus.

Todus hypochondriacus. Several specimens. This bird corresponds quite closely to Lesson's description of *T. mexicanus*, but wants the yellow margin to the scarlet gular patch. It can be easily distinguished from any other of the described West Indian species by the golden-yellow flanks; this character I should have thought to be a mark of immaturity, if I had not observed so large a number of the Cuban and Jamaican varieties at the same period of the year when these specimens were obtained, none of which presented any such appearance.

No. 36,450. Length of dried skin 90; wing from flexure 42; tail 28; tarsus $10\frac{1}{2}$; middle toe and claw 12; claw alone 3; bill along ridge 20; 3d, 4th and 5th primaries nearly equal and longest; 1st shorter than the secondaries; 2d about equal to them. All above, with closed wings and tail, bright green, with a slight yellowish tinge next the nostrils; the tip of the tail and bases of the outer primaries slightly bluish; outer edge of outer tail feathers ashy. Beneath, throat bright scarlet, bordered on each side by a whitish line commencing at the base of the rictal bristles and gradually shaded into the pearl-grey of the fore neck and breast. Centre of abdomen nearly pure white shaded anteriorly into the pearl-grey of the breast and posteriorly and on the sides into the yellow of the crissum and the golden-yellow of the hypochondriacs; upper mandible dark brown, lower yellowish; tarsi and toes light yellowish-brown. The genus *Todus* has been alternately placed with the kingfishers and the flycatchers, and lately with the motmots. It has in structure no affinity with the first whatever, and its habits are entirely different. Its plumage is loose, the wings feeble and its legs long. It resembles the motmots in the serration of the edges of the mandibles, but the toes are not partially united as in those birds; the bill is excessively depressed and the tail short and square, while its habits are totally dissimilar.

Some of the flat-billed tyrants have perhaps more analogy with it, particularly in their habits, but it differs from them in the appearance of its eggs and manner of incubation, as well as in many other important particulars. It seems to me to form an entirely distinct family *Todidae*, which cannot be included in any other.

Sylvicola.

Parula.

Sylvicola americana Linn.

Dendrœca.

Sylvicola coronata Linn. The southern migration of this bird is more extensive than I had supposed. It was extremely abundant in the interior of Jamaica in the winter of 1864–5.

Sylvicola discolor Vieill.

Sylvicola Adelaidæ Baird. This new species was described by Professor Baird in his review of North American Birds.

Setophaga.

Setophaga ruticilla Linn.

Turdus.

Mimocichla.

Turdus ardosiaceus Vieill. Abundant.

Mimus.

Mimus polyglottus. Var. *portoricensis.* Several specimens. A variation in white markings is the most indefinite of characters, and I am inclined to think that this bird, with *orpheus*, *dominicensis* and *cubanensis*,* etc., should be considered as varieties of *polyglottus.* I have never seen a specimen of *M. dominicensis*, but as Mr. Sclater, comparing it with *Orpheus* says of it "forsan ab illo vix distinctus," I presume it cannot be the same as the present bird, as this is easily distinguished from *Orpheus.* In a typical *polyglottus* the whole of the outer tail feather is white as is the 2d, with the exception of a portion of the outer and a scarcely perceptible spot on the inner web; but the white occupies only a small portion of the 3d and the extreme tip of the 4th. In the present bird the white occupies the whole of the 1st and 2d outer tail feathers and the inner web and basal half of outer web of 3d, the basal 5th of outer web and tip of 4th and a scarcely perceptible spot on the tip of 5th. In *Orpheus* the white occupies all the three external tail feathers except a small spot on the outer web of the 3d

*The Cuban mocking-bird is easily distinguishable from *polyglottus.*

near the tip; the basal third and quite a large spot, more than an inch in length, near the tip of 4th, and a very distinct spot on the tip of 5th.

No. 33,476. Length of dried skin, 205; wing from flexure, 110; 1st primary more than $\frac{1}{2}$ of 2d; 3d, 4th and 5th, nearly equal and longest; 2d, longer than 8th; tail, 110; tarsus, 31; middle toe and claw, $28\frac{1}{2}$; claw alone, $8\frac{1}{2}$; bill along ridge, 21. Above ashy, feathers of the head with the centres darker, lores dusky, a whitish supra-ocular line, commencing at the nostrils gradually disappearing behind the eye. Wings blackish-brown, the middle and inner greater coverts tipped with white and with the margins narrowly edged as if faded, the outer greater coverts white with a spatulate shaped spot of dark brown running down the shaft near the tip; the smaller coverts edged with ashy like the back, base of all the primaries white, extending farther on the inner than outer webs, occupying about $\frac{1}{6}$ of the first and $\frac{4}{5}$ of the 10th. Secondaries tipped with white, and narrowly margined as if faded. Tail blackish-brown, marked with white, as above described; beneath white, the bristly tips of chin feathers black and a very indistinct black stripe formed by the blackish tips of the feathers; bill black, tarsi and toes dark bluish horn, claws black.

Hirundo.

Progne.

Hirundo dominicensis Gm.

Petrochelidon.

Hirundo fulva Vieillot.

Certhiola.

Certhiola flaveola. Var. *portoricensis.* Several specimens. Readily distinguishable from the Jamaican bird by its smaller size, the lighter color of the back and throat and the absence of any tinge of red in the yellow of the breast.

Vireo.

Vireo Latimeri Baird. This species will be described by Prof. Baird in his "Review."

Tanagra.

Spindalis.

Tanagra portoricensis. Several specimens.

No. 36,502. ♂. Length of dried skin, 150; length of wing, 81; length of tail, 60; length of bill along ridge, 9; tarsus, $20\frac{1}{2}$; middle toe and claw 23; claw alone, $6\frac{1}{2}$. Head black with two white stripes on each side, a supra-ocular one commencing a short distance from the nostril and an infra-ocular one commencing at the ramus. Hind neck bright golden-orange, forming a very conspicuous nuchal collar. Back, scapulars, rump and upper tail coverts greenish-olive, brightest towards the tail and with a dusky streak down the shaft of the feathers next the nuchal collar. Wings dark brown, the smaller coverts next the body of the same color as the back, those next the bend of the wing showing more or less bright ferruginous. Middle coverts bordered with olivaceous, faded at the tips and external border into whitish. Greater coverts bordered externally with white shaded into olive at the base, all the remiges but first bordered with lighter, most conspicuously on the inner secondaries and gradually shaded with dull whitish into olivaceous on the outer secondaries. Tail dark-brown, external borders of the feathers somewhat olivaceous towards the base and the inner web of outer feather, with a scarcely perceptible border of white near the tip. Chin white, continuous with the infra-ocular stripe, and like it with the tips of the feathers black. Upper part of the centre of the throat bright yellow, gradually shaded into deep orange on the fore neck and bordered on each side by a conspicuous black line which nearly meets its fellow opposite the base of the skull and again recedes. Breast yellow shaded abruptly into the orange of the fore neck. Centre of abdomen white, flanks and hypochondriacs greyish-olive obscurely streaked with dusky; tail and crissum hoary brown, the feathers of the latter broadly bordered with white. Upper mandible black, under mandible bluish horn. as are the tarsi and toes.

♀. Dimensions nearly similar to those of ♂. Above greenish olive, yellowish towards the tail, and with the centre of the feathers of the head brownish-ash. Wings without any ferruginous on the bend of wing, and the light borders of the feathers more olive than in the male. Tail as in the male. Beneath pale dusky-yellowish with dusky streaks down the centre of the feathers. very much as in *Dulus dominicus*, Young ♂ like female, but with traces of chestnut at the bend of wing.

The species of Tanager generally united under the name of *Spindalis* form two distinct groups, in the first of which the plumage of the female is somewhat like the male and the bill is much stronger than in the second. This is the type of *Spindalis*, and contains the species *T. nigricephala*. In the second the plumage bears no resemblance to that of this male, and the bill is weaker; if the absurd system of forming genera on every little difference is to be adopted this might be called *Spizampelis* — it contains three species, *T. Pretrei*, *T. zena*, and the present bird.

Fringilla.

Phonipara.

Fringilla zena * Linn. 1758. Var. *portoricensis.* Several specimens. The resemblance of this bird to specimens of *F. zena* from the Bahamas is very great; the only difference I have been able to perceive is a slightly brighter tinge of olive and perhaps less extent of blackish beneath; it would seem to be intermediate between *zena* and *omissa* of Jardine's Catalogue of Birds of Tobago.

Coturniculus.

Fringilla passerina Wils. Specimens representing the *F. tixicrus* of Gosse from Jamaica, and not distinguishable from the bird of the United States.

Loxia.

Spermestes.

Loxia cucullata Swain. Several specimens of this well known African bird. It has probably been naturalized in the island as the common European sparrow has in Havana.

Pyrrhulagra.

Loxia portoricensis Daud. Several specimens, but none in adult male plumage. The subgenus *Loxigilla* Lesson was founded on *Fringilla noctis.* The type of Bonaparte's subgenus *Pyrrhulagra* is the present bird, and includes *violacea* of the Bahamas, etc., but not *anoxantha* which may form the type of a third subgenus, *Loxipasser*, nearly allied to *Spermophila* and *Phonipara.* These three birds show well the folly of modern generic divisions, either of them approximating more closely to older genera than to each other.

Icterus.

Icterus xanthomus Sclater. Several specimens.

Icterus dominicensis. † Var. *portoricensis.* This bird in full plumage is easily recognized from the St. Domingo bird by the absence of yellow on the hypochondriacs, and the greater propor-

* Linnæus describes two birds under the name of *Fringilla zena* in the edition of 1758, the first now called *Tanagra zena* and the second generally known as *Fringilla* or *Phonipara bicolor,* but which should be *Fringilla* or *Phonipara zena* Linn.

† *Icterus dominicensis* Var. *hypomelas* Dubus, Bonap. Conspec. Vol. 1. p. 433, from Cuba. Adult, marked very much as in *portoricensis* but with less yellow on the lower part of abdomen. Young, greenish olive with the throat blackish, very similar to the *dominicensis* from St. Domingo. This variety in adult plumage resembles *portoricensis* quite closely, but differs entirely from it in the plumage of the young. The number of specimens is too large to admit any probability of this difference not being constant.

tion of black on the upper tail coverts and crissum. The plumage of the young bird is reddish-olive above, deepest on the head and shaded into yellow on the rump; rufous-olive beneath with a yellow ground, the rufous deepest on the breast and with the upper part of throat nearly yellow.

Quiscalus.

Quiscalus crassirostris Sw.? Resembling closely the Jamaica bird, but smaller and with the purple of the back extending to the tips of the upper tail coverts instead of becoming greenish on the rump.

Alcedo.

Megaceryle.

Alcedo alcyon Linn.

Coccyzus.

Coccyzus minor Linn. Several specimens of this bird from Porto Rico cannot be distinguished from others in the Smithsonian Collection from Jamaica, St. Thomas, Santa Cruz, Cuba, Central America and Florida? Their average size is rather larger instead of smaller as stated by Mr. Taylor, though this difference I consider of no importance, as specimens of our common yellow-billed cuckoo can easily be found varying an inch in length. A specimen collected by Mr. Newton in Santa Cruz is identified as *nesiotes* Cabanis, by Mr. Sclater. This bird resembles precisely the other specimens in the collection. In Cabanis' description of *nesiotes* the only specific character given is the total absence of white on the outer web of the outer tail feather. I have never seen any adult yellow-billed cuckoo possessing such a character, and certainly the specimen identified as *nesiotes* by Mr. Sclater does not. Young birds of the present species, and perhaps of all the yellow-billed cuckoos, have the tail marked as in the black-billed species; several specimens in the collection of the Academy of Natural Sciences clearly demonstrate this. Some confusion seems to exist in the determination of the West Indian species of the subgenus *Coccyzus*, which has not been diminished by Mr. Sclater in his monograph of this group, in which the bird identified as *Dominicus* by Professor Baird is described as a new species under the name of *Bairdii*. As I have never seen a specimen from St. Domingo I cannot determine whether Professor Baird was correct in identifying the Jamaica bird as that species, but Mr. Sclater certainly errs in comparing it with *Americanus*, as the specific characters of Professor Baird's species are the rufous edging of the quill feathers not found in the latter bird and the tail marked as in *erythrophthalmus* instead of the distinct black and white tips of *Americanus*. Notwithstanding the authority of Mr. March, who states positively that this bird breeds in Jamaica, I think it nothing but an immature specimen of one of the species already known. The locality of the specimen marked Florida, formerly in Mr. Audubon's possession, I consider extremely doubtful; though there is no reason why any Cuban bird possessing equal powers of flight should not cross the narrow strait separating that island from the Tortugas.

Saurothera.

Saurothera Vieillotii. Var. *rufescens.* Three specimens.

No. 36,440. Length of dried skin, 270; wing from flexure, 130; tail, 226; bill along ridge, 45; from nostril, 30; along gape, 51; tarsus, 35; middle toe and claw, 55; claw alone, $9\frac{1}{2}$; depth of bill at nostril, $9\frac{3}{4}$; breadth of bill at nostril, $8\frac{1}{4}$. Above bronze-green washed with rufous growing deeper to the forehead where the green disappears. Wing same as back, but with a decided rufous edging to the primaries, brightest towards their base. Tail bronze-green with a broad subterminal bar of black extending a little farther anteriorly on the outer web of all but the inner feather and a narrower but very conspicuous terminal bar of white, both narrowest on the central feathers. Beneath, throat soiled white. Fore neck and breast pale cinereous shaded gradually on the sides into the color of the upper parts. Abdomen, tibiæ and crissum, rufous. Under surface of wing pale rufous, except the exposed tips of the primaries which are shaded with olivaceous. Under surface of tail hoary olive-brown, barred as above.

Crotophaga.

Crotophaga ani Linn. Several specimens rather larger than those from Cuba or Jamaica.

Picus.

Melanerpes.

Picus portoricensis Daud. Several specimens.

Psittacus.

Chrysotes.

Chrysotes ———. A species not yet identified.

Columba.

Geotrygon.

Columba montana Linn. Nearly if not quite identical with the specimens from Jamaica.

Zenaida.

Columba zenaida Bon.

Chamæpilea.

Columba passerina Linn.

Ardea.

Ardea egretta Gmel.
Ardea cærulea Linn.
Ardea exilis Gmel.

Aramus.

Aramus giganteus Bon.

Tringa.

Tringoides.

Tringa macularia. Several specimens.

Gallinula.

Gallinula galeata Licht.
Gallinula martinica Linn.

Rallus.

Rallus carolinus Linn.

Prof. A. E. Verrill gave an account of a new Preservative Solution which he had invented as a substitute for alcohol in the preservation of Natural History specimens.

After having made many experiments with a variety of substances, the only entirely satisfactory results were obtained with one of the simplest and cheapest solutions. For convenience the two following solutions may be prepared.

SOLUTION NO. I.

Water	1 gallon.
Common Salt	$2\frac{1}{2}$ lbs..
Nitre	4 oz.

Dissolve either by heat, or at ordinary temperatures. Filter the solution through paper, or some other medium to render it bright and clear.

This is the standard solution, and may be kept in quantity.

SOLUTION NO. II. (ARSENICAL.)

Water.	1 gallon.
Solution No. 1.	1 quart.
Arseniate of Potassa	2 oz.

This solution should be used with care on account of its highly poisonous nature, but from its strongly saline character there is no danger of its being swallowed ignorantly. It will not usually need filtering. The amount of arsenic may be diminished to one ounce, or less, per gallon, in cold weather or for objects that are readily preserved, as all vertebrates, except fishes, anatomical preparations, etc.; but for marine invertebrates and larvæ of insects, the full strength should be used. Solution No. 2., it must be remembered, is intended *only for temporary use while the object is being saturated with the saline solution.*

To use these solutions the specimen should be placed in No. 2, which may be diluted with even more water for vertebrates, in cool weather, and allowed to remain for a few hours, or until the salts have penetrated the tissues. It should then be transferred to another vessel containing Solution No. 1, diluted with an equal amount of water. After remaining in this until saturated with its salts, which may usually be known by its sinking to the bottom, it may be transferred to a fresh portion of No. 1, and allowed to remain till it is desired to put it up permanently, when it should be put into a new lot of the solution. The specimens should be kept under each of the liquids until they become saturated, and sink of their own accord. The object of making several transfers is to bring the strength up gradually, and thus saturate all parts of the tissues uniformly, avoiding the contracting and hardening of the exterior, which would be produced if placed directly into the strongest solution. All kinds of preservative solutions produce their best effects only when used in this way — *alcohol not excepted.*

Large specimens of fish, etc., should be opened upon one side of the abdomen to admit the liquid more readily, and the intestines may be injected. Many kinds of preparations may be permanently kept in a solution of not more than half the strength of No. 1, if not too much crowded, and well preserved when placed in it. To keep the solution in glass jars permanently, the stoppers, whether of cork or glass, should be coated with a solution of paraffine in benzine or turpentine, or some similar preparation. The necks of the bottles should also receive a coating of the same. Such a solution applied to the staves of casks will render them impermeable to the solution.

By means of this method we have succeeded in preserving larvæ and pupæ of Sphingidæ, and other insects, with their natural color and form remarkably perfect. It has also succeeded well for preparations of the soft parts of Mollusca, producing little or no contraction; and for fishes and other vertebrates, and worms, etc. It also preserves many plants, fruits and flowers, much better than alcohol, — the green color of mosses, especially, is beautifully preserved.

Mr. Verrill also spoke of the advantages of using a mixture of transparent gelatine and glycerine, instead of Canada balsam for mounting microscopic preparations of entire insects, prepared by dissolving their soft parts in caustic potash, and washing in dilute acetic acid. The mixture consists of gelatine dissolved in a small amount of water, with about one fourth as much glycerine, and is to be applied warm, in a manner similar to that used for balsam. The specimens mounted in this way do not require drying, and may be transferred directly from the water in which they are washed, to the slide. After the thin glass has been pressed down, and allowed to remain a short time in a cool place, the mixture becomes quite firm, and may be cleaned from around the edges of the thin glass, and a circle of some cement applied so as to guard against any injury from dampness. A mixture of India rubber and mastic dissolved in chloroform answers admirably for this purpose. Upon specimens of insects prepared in this way he had been able to make many interesting observations upon the cellular structure of the integument, and the morphology of the organs. The cells of the rings of the abdomen, both in the thickened portions and the thin membrane between, in the elytra of beetles, and of most other parts are brought out beautifully in these preparations. One fact of considerable interest that may be readily demonstrated by these preparations is, that each face of the cornea of the compound eye is a modified cell, similar to the cells which form the integument of the jaws, wings, legs and abdomen, differing chiefly in being more regular in form, and usually somewhat larger, though cases occur in which the cells of the head and mouth parts, or the elytra of beetles are as large as the facets of the eye. The form of the facets is also variable, some being circular cells not very numerous and not crowded, but with intercellular spaces, as in some *Aphidæ*, while in most insects they become very numerous, crowded, and hexagonal or polygonal, sometimes varying in form in different parts of the eye in the same insect. In the Grape Hopper (*Tettigonia vitis* Harris), the cells of the enlarged front of the head are nearly as large, and about as distinct as the eye facets, and their identity of origin is perfectly evident.

Mr. Verrill also gave an account of some investigations upon the Geographical Distribution of North American Birds, made with reference to the physical causes that determine their limits in latitude.

He had found that the boundaries between the Canadian and Alleghanian Faunæ, as described in a former paper,* are coincident with a line which shall indicate a mean temperature of 50° Farenheit, during the months of April, May, and June. This line commences on the eastern coast, near the mouth of the Penobscot River, in Maine, thence it passes inland curving farther to the east, so as to form the northern boundary of the belt of coast-land along the shores of the Bay of Fundy, which is characterized by forests of coniferous trees, but smaller in size than in Northern Maine. The low temperature of this region is evidently caused by the influence of the cold waters of the Arctic current, which sweeps along the coast, producing even in mid-summer, cold fogs, whenever southern winds prevail; the influence of these fogs and cold south winds diminishing in going inland from the coast. The meterological data at his command were insufficient to determine whether the line of 50° extends into central New Brunswick, which is, however, quite probable. After reaching its eastern limits in the interior, the line turns to the westward so as to enclose a narrow belt of country reaching as far northward as the southern part of Aroostook County in favorable localities, and bounded on the north by the coniferous forests of Northern Maine. It passes south of Moosehead and Umbagog Lakes, but rises somewhat northward along the Androscoggin Valley, thence it passes southward of the White Mountains, through the vicinity of Conway, N. H. It bends northward again up the Connecticut Valley as far as Craftsbury, Vt., where the mean temperature is 50° 91. It turns to the southward again along the eastern slope of the Green Mountains, the higher portions of which, even in Western Massachusetts, and perhaps in Connecticut, have a temperature below 50°. West of the Green Mountains it suddenly bends far to the north, along the Champlain Valley, and thence to the valley of the St. Lawrence, as far at least as Montreal, then following the river, it apparently extends to Lake Ontario. The Adirondack region is skirted on the eastern side along the shore of Lake Champlain by a branch of this line, which, passing to the south of this extensive mountain region, unites with the northern branch, thus leaving the entire Adirondack region as an island of the Canadian Fauna, surrounded by the Alleghanian, just as, geologically, it is an island of *azoic*, granitic rocks, surrounded by the Silurian limestones, sandstones, and slates, which form the low lands on all sides, resting against the flanks of the mountains, and extending inward along the river valleys. The line appears to cross Lake Ontario and the southern part of Lower Canada, entering Michigan in the vicinity of St. Clair. It crosses the northern part of Wisconsin north of Milwaukee, and then bends northward up the

* Proceedings of the Essex Institute. Vol. III, p. 136.

Valley of the Mississippi as far as St. Paul, and perhaps along the Red River of the North, but in that region there is again a lack of data for accurate determination. Where this line reaches the Middle Ornithological Province of the North America, so well defined by Prof. Baird,* and whether corresponding divisions by temperature exist in the Middle and Western Provinces, are questions that can only be determined by more extended observations.

In like manner the line of 65° mean temperature, during the same months, coincides with the boundary between the Alleghanian Fauna and that of the Southern States, or Louisianian Fauna. This line commences on the Atlantic coast, near Portsmouth, Virginia, and passes up the Valley of the James River, thence to the vicinity of Gordonsville, Va., and westward till it reaches the eastern slope of the mountains of central Virginia, when it passes far to the south through the Carolinas and Georgia along the mountain region, which it finally crosses, and then turns again to the northward along its western side. It passes through central Tennessee, north of Memphis, and through Kentucky, bending northward up the valley of the Ohio nearly to the vicinity of Cincinnati, and up the Mississippi to an undetermined distance beyond the mouth of the Ohio. West of the Mississippi the line has not been satisfactorily determined.

Again the temperature of Southern Florida, during the same time, is about 80°, and there we find a few birds that do not extend farther northward, and one that is peculiar to that region; thus indicating the commencement of another fauna, which may, perhaps be considered as a part of that of the West Indies.

From this remarkable coincidence between this system of lines of temperature of the months of spring and early summer, with what had been already observed in the actual distribution of birds, we must necessarily infer that they are chiefly influenced so far as latitude is concerned, by the temperature of the breeding season. Therefore we should expect that in all other countries, the tropics, perhaps, excepted the same law would hold good. Whether a similar law controls the distribution of Mammalia, Reptiles, Insects, etc., can only be determined by farther investigation. Prof. Dana, in his great work on the Crustacea of the United States Exploring Expedition, established the law that the distribution of Crustacea in latitude is controlled by the mean temperature during the *winter months*, which is evidently a law analogous with what we have observed in birds.

It has also been observed by several botanical writers, that the distribution of vegetation is controlled by the temperature of the summer months,—the mean temperature of June, July, August, and September, being usually considered the most important for this

* American Journal of Science, Jan., 1866.

purpose. Thus the northern limit of the grape, both in Europe and America, is nearly coincident with the line of 65°, during those four months, which is the period of flowering and ripening of the fruit. Some varieties of grape require a much higher temperature during the same time. Many other plants are controlled by the same law, but this law in the case of plants is modified by other causes, as moisture, nature of the soil, early or late frosts, etc.* In the eastern United States the lines of average temperature during these four months, coincide nearly with those of the three months which influence birds. Thus the northern limit of grapes (65°) mentioned above is nearly coincident with that of 50° for birds; and that of 80° for plants agrees approximately with that of 65° for birds. For this reason we find that the limits of the Floræ and Faunæ are nearly the same in many cases. Thus the limit of the Alleghanian Fauna is also the limit, or nearly so, of the grape, chestnut, hickory, white oak, and other species of oak, and many other species of plants, while the region of the Canadian Fauna is characterized by coniferous forests, and especially by the mixed forests of spruce, fir, larch, and white birch. As many insects and other animals are directly dependent upon particular kinds of vegetation, their distribution must be influenced by the same causes, even if the temperature of their breeding seasons does not affect them directly.

Dr. Jackson presented specimens of cretaceous fossils *Cardium Cooperi* Gabb, and *Amauropsis alveolatus* Conr, collected by himself at Santa Barbara, and labelled by Mr. Gabb. The chalk formation is overlaid by the miocene strata, where are also deposits of asphaltum and bituminous oil in the cretaceous rocks, the oil rising up through the tertiary strata. He also described the Quicksilver deposits of Santa Barbara. He then remarked upon the Borax found in a small lake in Lake County, Cal., which was examined by Dr. Torrey. This was a shallow lake, with hot mineral springs rising in it, in a region where the soil is charged with carbonate of soda, which unites with the boracic acid thrown up in these springs, thus forming the biborate of soda; and as the lake dries up, crystals of borax are left in the mud at the bottom. The borax is now obtained by sinking iron coffer dams to the bottom, and then pumping out the water, when the clay is dug out, containing crystals, sometimes as

*For an exposition of these laws see Articles in the Reports of the Agricultural Bureau of the U. S. 1862, 1863.

large as a man's thigh. In this state it is very pure, enough so to be used in the arts; but is redissolved and recrystallized to sell more readily in the markets. This region about Clear Lake is a volcanic centre, and is the only locality of borax as yet discovered on this continent; also there are mines of sulphur worked, the mineral being simply dug from the soil; Geysers also occur there.

He also spoke of the mines of Oxide of Tin near Los Angelos; and exhibited specimens of the "Wood Tin" from Durango County, Mexico, which is found by placer mining in the alluvial clayey soil. It is called Wood tin from having lines like those of the annual growth in wood; it is very heavy, and contains seventy-nine per cent. of metallic tin. He also exhibited the gold bearing clay slate of Jurassic age, and read some notes on the gold mines he had visited in Amidor and Grass Valley.

Dr. James C. White gave the following description of an enormous human skull presented by Dr. C. T. Jackson in the name of Dr. C. A. Kirkpatrick, U. S. A.

This skull was dug up in excavating for the foundations of Fort Point, Golden Gate, at the entrance of the harbor of San Francisco. As will be seen by the accompanying measurements, it is among the largest skulls of the Red man ever described. The bones of the face, including the lower jaw, are very massive. The nasals are flattened, and the nasal cavity is nearly quadrangular. The supraciliary ridges are very little developed, presenting in this, as in other respects, a striking contrast to the California skulls, which are described on p. 69 of the present volume. The general shape of the skull is brachycephalic, the vertex being much elevated, and presenting a prominent bulging at the junction of the coronal and sagittal sutures. The zygomatic arches project but slightly when viewed from above. The teeth are small and much worn.

MEASUREMENTS.

Internal capacity	100 cubic inches.	
Longitudinal diameter	7.50 inches.	
Parietal diameter	6.10	"
Frontal diameter	4.20	"
Vertical diameter	5.60	"
Intermastoid arch	16.00	"
Intermastoid line	4.50	"
Occipito-frontal arch	15.00	"

Horizontal periphery	22.00 inches.
Length of head and face	8.20 "
Zygomatic diameter	6.00 "
From anterior edge of foramen magnum to alveoli	4.00 "
From anterior edge of foramen magnum to occiput	3.90 "
Breadth across malar bones	5.70 "
Transverse diameter of orbit	1.80 "
Vertical diameter of orbit	1.60 "
Inter orbitar space	1.10 "
Length of nasal bones	1.20 "
Transverse diameter of nasal opening	1.15 "
Vertical diameter of nasal opening	1.15 "
Vertical height of malar bones	1.46 "
Length of foramen magnum	1.75 "
Breadth of foramen magnum	1.30 "
Height of symphysis of lower jaw, exclusive of teeth	1.50 "
Breadth of lower jaw through angles	4.80 "
Distance from angle to condyle	4.00 "
Breadth of ramus between angle and condyle	1.70 "

Dr. Jackson also presented the skull of a Piute Indian from an old battle field, near Austin, Nevada. This specimen, in the strongly developed superciliary ridges, narrow frontal diameter, and great projection of the zygomæ, resembles the skulls from Stockton above alluded to. The measurements are as follows:

Internal capacity	73 cubic inches.
Longitudinal diameter	7.10 inches.
Parietal diameter	5.10 "
Frontal diameter	3.80 "
Vertical diameter	4.90 "
Intermastoid arch	13.50 "
Intermastoid line	4.00 "
Occipito frontal arch	13.90 "
Horizontal periphery	19.50 "
Length of head and face	7.80 "
Zygomatic diameter	5.30 "

List of Vertebrates observed at Okak, Labrador, by Rev. Samuel Weiz, with Annotations by A. S. Packard, Jr., M. D.

The following list of Vertebrates was furnished me by Mr. Weiz, who resided upwards of seventeen years as a missionary at the Moravian station at Okak, in Northern Labrador. It is presented just as transcribed from Mr. Weiz's manuscript, and is published without any alterations, at the suggestion of Professor S. F. Baird. It will be observed that quite a number of the species are those bearing the name of their European representatives, but experts in

American zoölogy will readily correct such identifications. The accompanying names in the Esquimaux language give an additional interest to the list. Thus the Esquimaux of Labrador had a name for the musk ox, which tends to prove that its range was formerly extended as far south as latitude 56°–58° on the Peninsula of Labrador, which is an advance southward of about 35° beyond its present high polar limits. Its occurrence has, however, passed out of the memory of the present generation of Esquimaux, as we were informed by Mr. Weiz.

The fauna, as a whole, is closely allied to that of Southern Greenland, and is very free from the "boreal" species ranging over British North America. Indeed the insect and land-molluscan fauna of Northern Labrador is almost identical throughout with that of Southern Greenland, as are the climatal, topographical and general geological features of the coast. Did the mountains of Labrador rise above the snow line, where now they just reach its lower limits, we should have a perfect correspondence between the Atlantic slope of Northern Labrador and that portion of Greenland lying between the 60th and 70th parallels of latitude.

On the outer islands, lining the coast for fifty miles deep in the vicinity of Hopedale, the birds, insects, land mollusca and vegetation, present an almost purely circumpolar character. Thus the *Polyommatus Franklinii* and some other insects, were very abundant, being the same species as those discovered by Sir John Ross in high latitudes; and many square miles of rocky islets, supporting no trees or shrubs rising higher than six inches, agree very exactly with descriptions of similar lands in latitudes 70° and 80°. This is owing to the immense fields of floating ice filling up the channels and friths between these islands throughout the entire short summer of six weeks, thus greatly reducing the temperature, while in October the bays and inlets freeze up solid until the following June.

MAMMALIA.

Ursus maritimus. Nenok.
" *americanus.* Atlak.
Cervus tarandus. Tuktu.
Canis lupus. Amarok.
Canis. Kremmek.
" *vulpes.* Terrieniak.
" *argentatus* (an *vulpes? mesomelas.*) Kernertak.
" *crucigera.* Akkorngartak.
" *vulpes* (an *V. fulvus.*) Kajok.
" *lagopus* (an *C. lagopus.*) Kachortarsukuluk

Canis. Temeriasusak?
Mustela martes. Kabiaitsiak.
" *vison.* *M. canadensis.* Kaũajomiut. Mink.
" *erminea.* Terriak.
Lutra vulgaris. Pamioktok.
Gulo luscus. Wolverene. Kappik. *Meles hudsonicus.*
Hystrix dorsata. Illakosek.
Lepus variabilis? Ukkalek.
" *americanus.* Ukkaliartsiak.
Sciurus hudsonicus (an *cinereus*?) Siksik.
Sciurus. sp. ? Siksivak.
Pteromys volans?
Raccoon. Nunivakak (allgemein).
Georynchus lemus. Leming. Avignak.
Arvicola hudsonicus.
Myodes hudsonicus.
Sorex Fosteri. Ukounavik.
Castor zibethicus. Kirgaluk.
Felis canadensis. Perktusezak.
Bos moschatus. Umingak.
Castor fiber. Kigiak.
Trichecus rosmarus. Aivek.
Phoca barbata. Uksuk.
" " Young. Terrigluk.
Phoca grœnlandica. Kairolik.
" " Young. Kairolak.
Phoca vitulina. Netsek.
" " Young. Netsearouk.
Stemmatopus cristatus. Netsevak.
" " Young. Netsevarak.
[?] Kassigiak.*
Balæna mysticetus. 60–70 feet in length. Arvek.
Physeter an *Catodon.* 60 feet in length. Tikkagulik.
Balæna physalus. 60–70 feet in length. Pamioligarsuvak.
Delphinus serra? 20–30 feet in length. Arluk.
" ? *Grampus.* 20–28 feet in length. Pamioligarsuk.
" *leucas.* 12–16 feet in length. Kellelugak.
Monodon monoceros. 20 feet long. Horns 6–10 feet in length. Aglangoak.
Delphinus phocæna. 5–6 feet in length. Nisarsak.

* This is the Greenland word for *P. vitulina.* See Naturhistoriske Bidrag till en Beskrivelse af Grönland, af I. Reinhardt, etc. Copenhaven, 1857. p. 5.

BIRDS.

Aquila albicilla. Nektoralik. Breeds.
Falco islandicus. Kigavik. Breeds.
" *peregrinus.* Kennuajok. Breeds.
" *lagopus.* Kennuajok. Breeds.
" *æsalon.* Breeds. *F. palumbarius.*
Strix nyctea. Okpik. Breeds.
" *nisoria,* (funerea). Nuillatok. Breeds.
" *brachyotus.* Imaingertak. Breeds.
" *Virginiana.* Ikketojok? Breeds.
Corvus littoralis (corax). Kuppernaksoak. Breeds.
" *canadensis.* Kuppernaksoak. Breeds.
Turdus migratorius, 16–20 May. Ikkarilik. Breeds.
" *labradoricus.* Tullugarnak. Breeds.
[*T. Swainsoni?*]
Quiscalus niger.
Emberiza nivalis. Amauligak. Breeds.
" *lapponica.* Nessauligak. Breeds
" *calcarata.* Breeds.
Fringilla lapponica. Breeds.
Alauda alpestris. Breeds.
Anthus ludovicianus. Aviortok.
? Missaktak.
Regulus calendula. ?
Saxicola œnanthe. Erkogolik.
Sylvia coronata.
Fringilla leucophrys. Kutsertak.
" *linaria.* Sagsariak. Breeds.
" *Canadensis?*
" *hyemalis?*
Pyrrhula enucleator. Isaluk. Breeds.
Loxia leucoptera. Sennervainga. Breeds.
Loxia. sp.
Parus hudsonicus. Atsertalsajok. Breeds.
Picus tridactylus. P. hirsutus. Tuggajok. Breeds.
Hirundo riparia. Tullugarsuk. Breeds.
Charadrius semipalmatus. Kullekulliak.
" *auratus.* Ungilite?
" *squatarola?* Akpingek.
Numenius borealis. Akpingak.
" *hudsonicus.*
Tringa alpina. T. variabilis. Sigsariak. Breeds.
" *pusilla.* Lullaijox.

Totanus macularius. Sullaijok.
Tringa pectoralis. ?
" *maritima.*
" *islandica.*
? Tulik.
Phalaropus rufus. Savjak.
" *cinereus.* ?
Tetrao lagopus. Niksartok.
" *albus (salicti).* Akkigervik.
" *canadensis.* Akkigerlek.
Anser canadensis. Nerdlek. **Breeds.**
" *torquatus.*
" *leucopsis.*
" *hyperboreus.* Kangu?
Anas glacialis. Aggek. Breeds.
" *histrionica.* Ingiuliksiut.
" *acuta.* Iungak.
? Mitterluk.
Somateria mollissima. Mettek.
" *spectabilis.* Kingalik.
Anas perspicillata. Sorlotok.
" *islandica.* Unluktut.
" *Brownii.*
Mergus serrator. Pai.
Lestris parasitica. Ipungak.
" *crepidata.* ?
Larus glaucus. Nunja.
" *argentatus.* Kollelik.
" *tridactylus.* Nautsak.
" *eburneus.*
" *marinus.*
" *fuscus* an *flavipes.*
Procellaria glacialis. Kakkorluk?
" *pelagica.*
Thalassidroma pelagica. Kukkiliksoak.
" *Leachii.*
Cygnus. Swan. Koksuk.
Carbo cormoranus. Okaitok.
Sterna arctica. Imerkotailak.
Colymbus septentrionalis. Kaksaut.
Anas nigra. Uvingiajok.
Colymbus glacialis. Tullik.
Uria troile. Akpavik.
Uria grylle. Pitsiulak.

Mergulus alle. Akpalearsuk. *Uria alle* an *minor.*
Alca torda. Akpa.
Mormon arctica. Siggoluktok.
? Pitsiulapāk.
Seven more species are indicated.

FISHES.

Gadus morrhua. Ogak.
" *callarias.* Ogarsuk.
Salmo salar. Kavisilik.
Salmo trutta. Ekaluk.
? Anâklet.
? Idlût.
Pleuronectes platessa. Nettârnak.
Lophius lævigatus. Kanajok.
Clupea sprattus. Kolleligak.
? 1 foot in length. Kuksaonak.
? 8–10 inches long. Nakunak.
Tiktalik.
Nipisak.

NOTES ON THE MAMMALIA.

Canis fulvus Linn. The Red Fox occurred commonly at Stag Bay, with the following species.

Canis lagopus Linn. The "Blue Fox" is exceedingly rare about the mouth of Hamilton Inlet. An old hunter told me he had seen but three of them within a period of forty years. Their fur is shorter, and the tail shorter and more bushy than in the "Patch Fox." On a high isolated rock much frequented by sea birds, I noticed a Patch Fox with a murr's egg in its mouth. It is very tame and unsuspicious on the outer islands, where it lives evidently by robbing the nests of sea birds. It is the common statement of the hunters that the different varieties of this species are found in the same litter.

Putorius. The common weasel is very abundant and tame. In winter it is excessively annoying to the hunters by robbing their traps of the bait.

Lutra canadensis Sab. The Otter is now very rarely shot upon the coast.

Procyon lotor Storr. The Raccoon occurred at Square Island.

Sciurus hudsonicus Pallas. No squirrel was seen at any time upon the coast, though a skull which is referred to this species was found at Henley Harbor, opposite Belle Isle.

Castor canadensis Kuhl. The Beaver, with all the other most valuable fur animals, is rapidly becoming extinct upon the coast, though probably still abundant in the interior, in remote and inaccessible districts.

Fiber zibethicus Cuv. At Henley Harbor, Chateau Bay, a skin was shown me with much finer and longer fur than that noticed in the United States.

Erethizon dorsatum F. Cuv. The Porcupine was seen in Thomas Bay, a few mile south of Hopedale.

Ursus maritimus Linn. The white bear, or "Water Bear" as it is called by the inhabitants, is occasionally seen upon the Atlantic coast, where it is brought down on the ice by the Polar current. At "Square Island," a locality situated between Belle Isle and Domino Harbor, two cubs were captured and taken to St. Johns, Nfd. At Domino Harbor, the skin of a bear killed during the preceding spring, was obtained by one of our party. An intelligent hunter told me that the white bear was not unfrequently seen at Stag Bay, near Roger's Harbor, which is situated a little more than fifty miles south of Hopedale. One was killed there during the preceding winter, and in the autumn their tracks were "abundant." They were very shy, and could not be seen in the day time. Farther south they are much rarer. The last Polar bear said to have been seen in the Straits of Belle Isle, was shot fifteen years ago at the settlement of Salmon Bay.

Ursus americanus Pallas. The black bear is abundant on the southern coast, where it leaves its winter quarters in May, but above Hopedale is very rarely seen.

Rangifer Caribou Baird. The Caribou is still abundant upon the coast. In the summer it is found only on the tops of the hills, away from the woods. The hunters on the coast do not distinguish any varieties, such as the "barren ground caribou," in distinction from the "woodland caribou" of Audubon and Bachman.

Ovibos moschatus Blainv. As noticed in the list above given, the Labrador Esquimaux have a distinct name for the musk ox. It is naturally inferred from this interesting fact, that this species must formerly have ranged as far south as latitude 56° – 58° on the Labrador Peninsula.

Phoca vitulina Linn. The Harbor seal is not hunted by the sealers as its range is confined to the shores and inlets. I have seen it up the Esquimaux River ten miles from its mouth, in perfectly fresh water. The young weigh about thirty pounds, while the adult attains to a weight of about one hundred pounds. It should be observed that all the other seals, noticed below, only visit the coast in large numbers during the spring and autumn months; during the summer they are rarely seen, while *P. vitulina* is abundant the year round.

Of the *Phoca hispida* Erxl., no information could be obtained

Pagophilus grœnlandicus Gray. (Phoca grœnlandica auct.) This species is most abundant and extensively hunted by the sealers. The young soon after birth weigh 70–80 pounds, while the adult weighs 140–150 pounds.

Erignathus barbatus Gill. (Phoca barbata Fabr.) It is probably this species which is called by the sealers the "Square Flipper." It is very rare, and much the largest species known. The young weigh 140–150 pounds, while the adult will weigh 500 to 600 pounds.

Cystophora cristata Nilsson. The Hooded seal is not uncommonly, during the spring, killed in considerable numbers by the sealers. The young "pelt" weighs 70–80 pounds, while the old male or "dog hood," weighs 400 pounds.

Rosmarus obesus (Illiger) Gill. The Walrus was formerly as abundant on this coast, and about the Magdalen Islands and certain parts of Nova Scotia, as it now is in Greenland and Spitzbergen. In the sixteenth century, its great abundance in the islands of the Gulf of St. Lawrence, especially the Magdalen Islands, was commented upon by the early French voyagers, Cartier and Charlevoix, and its bones are still found in abundance on those islands. According to tradition, it also inhabited some of the harbors of Cape Breton; and I have been informed by a fisherman in Maine, whose word I do not doubt, that on an islet near Cape Sable, Nova Scotia, its bones are found abundantly on the sandy shore, fifteen to twenty feet above the sea. In the St. Lawrence Gulf they were exterminated by the Canadian and American fishermen during the middle of the last century. The last one seen or heard of in the Gulf, so far as I can ascertain, was killed at St. Augustine, Labrador, twenty-five years since. One was seen at Square Island fifteen years since, and two shortly before that, and another was killed at the same place about eight years since. I saw the head of a young walrus, which was found floating, dead, having been killed, apparently by a harpoon, in the drift ice north of Belle Isle.

Balænoptera. The Fin-Back is frequently seen upon the coast.

Balæna mysticetus Linn. The Hump Backed Whale is commonly seen. This species shows its tail and the pale under side of the body, when it "breaches"; the Finback does not show its tail.

Physeter macrocephalus Linn. For many years the fishermen on the coast have noticed a school of nine sperm whales passing up and down the coast. Lately the number has been reduced to five, one of which, probably, was seen off Domino Harbor, in a large school of "Finners" and "Hump backs." The three genera can be easily distinguished by the differences in the stream of vapor spouted out when the animal comes to the surface to breath. Thus, according to my informant, Capt. I. Handy, an experienced whale fisherman, and a very accurate observer, the "spout" of the sperm whale issues in a single short stream of vapor from the extreme end of the nose, and curls over in front of the head. The spout of the Finback forms a single column of vapor about ten feet high. The Right, and Humpback, and Sulphur-bottom, all "blow" in a double stream, which is directed backwards toward the tail.

Monodon monoceros Linn. While the Narwhale is abundant, going in schools, in Hudson's Straits, it is a very rare visitant upon the coast of Labrador, and had not been seen by the Esquimaux near the Moravian settlements for at least twenty-five years.

Beluga leucas Pall. The White whale is not uncommonly seen passing in schools along the coast in the summer time.

Orca gladiator. The *Killer* which was described to me as having the head much shorter and blunter, and with longer teeth than the Grampus, from which it is easily distinguished by its sharp, dorsal fin, five or six feet high, is commonly said, by the fishermen, to attack the Right and Finback whales, "gouging out lumps of flesh." At Belles Amours, an individual was captured, from whose stomach five "shoulders" of the seal were taken.

Globicephalus melas Auct. The Black-fish, or Grampus, abounds on the whole coast.

REPTILES.

Rana septentrionalis Baird. A specimen of this species from Okak, identified by Prof. E. D. Cope, was presented me by one of the missionaries. The occurrence of any reptile in so extreme a climate is interesting. The genus has been observed on the Yukon River in latitude 60° N., but the climate of that region is much milder, as it is more inland. We were informed by the inhabitants that frogs were heard and seen during the short summer at Stag Bay, just north of Cape Harrison, Domino Harbor, Lewis Bay, and Henley Harbor.

Bufo americana Lec. A single specimen was obtained at Salmon Bay, in the Straits of Belle Isle. Though no direct comparisons were made, it did not apparently differ from our common toad.

Plethodon glutinosa Baird ? A specimen which is referred with some doubts to the above species was noticed in a stream at Belles Amours, Straits of Belle Isle. It was of a dark slate color, with a paler dorsal stripe, and about six inches in length.

FISHES.*

Scomber vernalis Mitch. A few mackerel are taken in August in

*For the identifications of the species and all remarks on their synonymy, I am indebted to Mr. F. W. Putnam.

Salmon Bay and Red Bay. The Straits of Belle Isle are evidently the northern limits of this genus.

Pygosteus Cuvieri Brevoort. Syn. *Gasterosteus Cuvieri* Girard. *Gasterosteus biaculeatus* Auct. *in part.* A large number of specimens from a tidal fresh water spring, near Salmon River, Straits of Belle Isle.

Ammodytes dubius Reinhardt. Four specimens from Sloop Harbor, collected in July. Until a comparison of these specimens with European ones can be made, I have considered them as the *A. dubius.* They differ from the *A. americanus* of our coast in having a much longer body. This species is probably the American one considered by some authors as the *A. Tobianus.*

Sebastes norvegicus Cuv. Young specimens were dredged in fifteen fathoms.

Gymnacanthus patris Gill. Three specimens from Henley Harbor, collected in July. This is the species described by Dr. H. R. Storer as *Acanthocottus patris*, and is referred to the genus *Gymnacanthus* of Swainson by Prof. Gill.

Cyclopterus lumpus Linn. Taken in the Straits of Belle Isle.

Gadus arenosus Mitchill (Gill.) Eight specimens from Sloop Harbor, collected in July. From a careful comparison I am satisfied that these specimens are the same species as the common cod of New England, the *Gadus* and *Morrhua americana* of authors, and which Prof. Gill considers as identical with the *Gadus arenosus* of Mitchill. Prof. Gill also has considered specimens of the cod from Labrador, which he had examined, as identical with our common species.

It happened that our vessel touched at the different harbors from Mecatina Island in the St. Lawrence Gulf to Hopedale, a distance of over six hundred miles, at times when the cod was successively making its first appearance. Thus at Gore Island, near Little Mecatina Island, we found the cod was just beginning to be taken by the fishermen, June 16. A few were seined July 6th, at Square Island, on the Atlantic coast. July 12th they were evidently breeding, as the females were full of spawn, their livers poor, with little oil in them, and the fish were generally in poor condition. At Tub Island harbor, which is situated on the north side of Hamilton Inlet, the fishery had not begun July 17th. Three days later a few were seined at Sloop Harbor, on the north side of Hamilton or Invuctoke Inlet, while at Strawberry Harbor, about fifty miles to the northward, they were caught in abundance on the 25th of July. The season was so cold and stormy, owing to the presence of the drift ice in an unusual quantity, and for a much longer period than for many years previous, that the fisheries were almost a failure, scarcely half as many having been taken as during the preceding year. It was the same with the salmon and the capelin.

The "rock cod," or *duffy*, as it is termed by the fishermen, which they consider less valuable than the deep water cod, swarms about the boats when the fishermen are seining the capelin, and are seen snapping them up.

Merlucius vulgaris Fleming ? "Hake." I was told by a fisherman that he had taken but one hake during a period of forty summers spent on this coast. He had never seen a Haddock on this coast. Both of these species are abundant at the mouth of the St. Lawrence in Bay Chaleur.

Brosmius flavescens Lesueur? A "Cusk" was caught in eighty fathoms in the Straits of Belle Isle. The specimen is in the Collection of the Lyceum of Natural History, Williams College.

Salmo salar Linn. Owing to the great lowering of the climate by the drift ice, the salmon fishery was almost a failure this season. The fishery had just begun at Henley Harbor, opposite Belle Isle, on the 28th of June, 1864. At Square Island they were not netted before the 12th of July; here they disappear usually about the 15th of August. July 23d they had not appeared at this point. At Thomas Bay, near Cape Harrison, they appeared on the 22d of July. At this place the salmon was said to disappear about the 20th of August. At Groswater Bay, (Hamilton Inlet), only two hundred tierces were taken during the whole season, when usually five times that number are caught.

The salmon remains upon the coast at the mouth of streams about a month, during the Labrador mid-summer, which corresponds in temperature to that of the middle of May in New England.

At Hopedale the salmon is quite rare, and I was informed that it was not common north of this point. It seems to be a rare species in Greenland, thus showing the close correspondence of the climate of the Labrador coast in latitude 57° to that of the southern coast of Greenland. One young specimen from a tidal stream at Belles Amours, Straits of Belle Isle, was collected June 28th.

Salmo immaculatus H. R. Storer. Three specimens from near Hopedale were collected July 29th. These specimens are unquestionably referable to the *S. immaculatus* of Storer, and are distinct from the *S. trutta* of Europe, with which species Perley and others have confounded them. They differ from *S. trutta* by having larger scales, and being without spots, as their name indicates.

Salmo sp? Two specimens from the Island of Ponds, near Domino Harbor, collected in July. This species, which, from its rather imperfect condition, I have not been able to recognize, appears to be closely allied to the *S. trutta* of Europe, being spotted as in that species, but of somewhat different shape, especially of the head. There are also specimens from Greenland belonging to this species in the collection of this Society, collected by the Williams College expedition to Greenland and Labrador in 1860.

Salmo hudsonicus Suckley. Three specimens from a tidal pond of brackish water on Square Island were collected July 15th. These specimens are identical with those mentioned by Dr. H. R. Storer as *S. fontinalis*, which Dr. Suckley referred to his *S. hudsonicus*; but from a comparison of the limited number of specimens, I am yet in doubt whether the Labrador brook trout differs specifically from the *S. fontinalis* of New England.

Mallotus villosus Cuv. The Capelin was very late in making its appearance on the coast this season, owing to the great quantity of ice, which likewise detained the cod. At Square Island, the 12th of July was the earliest date of their appearance in great numbers. July 4th, the young, about one inch in length, were seen swimming in the water, their bodies very transparent, so as to enable the vertebræ and ribs to be distinctly seen, and provided with very plainly marked heterocercal tails, in the upper and larger fork of which the vertebral column terminated.

The capelin spawns on pebbly shores near the water's edge,and I was informed by two fishermen who had each observed the act, that during the spawning of the female, two males swim close to her and press her between them, being enabled by the large and prominent ridge on the sides of the body to retain the female in this position between, and a little below them, so that as the eggs are pressed out they are fecundated by both males. This probably accounts for the much greater proportion of males to the other sex, as in a boat load of these fish it was often difficult to find a single female.

According to information received from intelligent fishermen, the capelin remains upon the coast the year round, but in winter retires to deep water. Is it not probable that the cod has the same habit of going from deep water in-shore and to elevated "banks," for the purpose of spawning during the spring and summer; and in the winter of retiring to depths inaccessible to the fishermen? Should the cod be found to present local varieties at intervals along the Atlantic coast as seems probably the case, it would be a natural inference that it did not migrate for hundreds of miles northward, following the coming of spring from Massachusetts to Hudson's Bay. It is abundant in Massachusetts Bay and on the coast of Maine during the same time in summer that it abounds on the Labrador coast and in Greenland. All the facts observed by us tend to prove that the cod does not migrate extensively, as commonly supposed.

Clupea. The herring fishery begins in the Straits of Belle Isle during the middle of August, after the cod fishery is over. The fact elicited from several intelligent fishermen, that the herring does not spawn abundantly upon the coast of Northern Labrador, that is, above the Mingan Islands, but visits the coast in schools after the breeding season is over, while it breeds abundantly on the coast of New Brunswick, at Bay Chaleur, the Magdalen Islands, and on the southern coast of Newfoundland, affords excellent data for limiting the southern boundary of the Arctic fish fauna on the eastern Atlantic coast. This line agrees with what we have defined* as the southern limits of the "Syrtensian Fauna," which as an assemblage peoples the coast of Labrador, and extends around the northern shore of the continent into Hudson's Bay; and southward, follows the line of floating ice, thus partially excluding Anticosti, embracing the Banks of Newfoundland, the banks lying off Nova Scotia and New England, such as Jeffries and St. George's Banks, and more faintly indicated on those banks of New Jersey which are swept by the southern extension of the Labrador or Polar current. An outlier of it is also found at the mouth of the Bay of Fundy. On the southern shores of Newfoundland, which are partially protected from the Polar current sweeping by to the eastward, upon which the Gulf Stream slightly impinges, though with a much diminished force, the herring breeds, as here the species is surrounded by physical and climatic conditions very precisely corresponding to those of Nova Scotia and Maine, thus constituting an outlying area isolated from, and yet belonging to the Acadian district or fauna. Therefore it appears that the line of floating ice, which extends down the coast of Labrador as far as the Mingan Islands, is the northward limit of the haddock and mackerel, while the herring, a member of the Acadian fauna, does not breed in any comparative abundance north of this point. The distribution of Radiates, Mollusca, Articulates and Fishes thus agrees very closely on the northeastern shores of the continent.

One person at Henley Harbor takes upon the average eight hundred quintals during the short summer season, and cures them there. A few herring were seined at Square Island on July 6.

I find in a lecture on the Herring Fishery by M. A. Warren, Esq., who owns one of the largest fishing establishments on the coast of Labrador, some observations on the herring as observed in Labrador and Newfoundland, which are here quoted, as the article is not likely to fall into the hands of American naturalists.

"The female herring in Newfoundland come near the shore in moderate weather, and deposit their spawn, generally at night, in from 3 – 5 fathoms of water. The males follow and shed their milt over it." . . . "It is impossible, without seeing it, to form any idea of the pro-

* Canadian Naturalist and Geologist. Dec., 1863.

digious abundance of the ova of the herring yearly deposited in Fortune Bay, and other of the favorite spawning beds of the herring. The water will at times be seen white with milt for many acres." . . . "From personal observation, and from all the information I can obtain, I believe there are several schules of herring that come in on different portions of our coast to spawn. It is certain there are several varieties of the common herring differing in size, shape, and solidity of flesh. In Fortune Bay, the spawn is deposited in the months of March and April; in St. George's Bay, in the month of May, and a fortnight later on St. Barbe's. My impression is that on the southern shore of the Labrador coast, the spawn is deposited in June, or early in July. During the months of August and September, the Labrador coast from Mecatina to Bear Island, is visited by vast shoals of large fat herring, which have in them neither roe nor milt. I consider these herring, by their size and appearance, to be of the same species or the same shoal as those which spawned in St. George's Bay, in May or in June, on the Labrador coast, and which pass on in September and October to the Arctic waters, or more probably to the depth of the ocean.

"Of late years herring seines have been much used on the Labrador coast, almost entirely superseding the use of nets, to the manifest injury of the fishing population. These immense seines, most of them more than one hundred and twenty fathoms long, often enclose over three thousand barrels of herring. During the first two to three years, over one hundred and fifty seines were used on the coast by Nova Scotia fishermen."

Mr. O. C. Marsh, of New Haven, exhibited bone implements, and the bones of several species of animals from a grave in a mound at Newark, Ohio. This grave contained six or eight skeletons, apparently of a short and stout race, differing quite essentially from the present Indian races.

Mr. Marsh had adopted the method, very successfully practised by Professor Lartet, of preserving the very fragile bones by soaking them in melted spermaceti.

The thanks of the Society were voted to Dr. Thayer for the human cranium presented by him.

Messrs. E. T. Cresson, Philadelphia, A. R. Grote, New York, and John King, Elgin, Ill., were elected Corresponding Members.

Dr. J. S. Lombard, Boston, Messrs. E. W. Dimond, Cambridge, H. A. Purdie, Chas. Jackson, Jr., and T. Hubbard, Boston, were elected Resident Members.

January 17, 1866.

The President in the chair.

Thirty-nine members present.

Dr. H. R. Storer remarked upon the reproduction of lost parts in man, and instanced cases of amputation in fœtal life by bands of lymph, and the pressure of the umbilical cord.

Prof. Wyman stated that *young* animals reproduced lost parts more completely than the adult, and the lower more readily than the higher. He had seen in South America a man whose arm ended in a stump, on which were five spherical bodies representing the fingers, which had been reproduced after amputation, probably by the umbilical cord. He also mentioned other instances of the reproduction of fingers after artificial amputation.

Mr. Putnam referred to the experiments of Brant and Siebold on Cryptobranchus. He had known instances of the reproduction of the toes and tail in our native salamanders.

Mr. Shaler made some further remarks on the formation of continents.

Prof. Wyman made some remarks on the cells of bees, and adverted to the honey and brood cells of *Melipona*, which as Darwin remarks, are a mean between the regularly hexagonal cells of the honey bee, and the rude cylindrical cells of *Bombus*, the humble-bee, being partially hexagonal in form. The question was raised whether the bee *intends* to make a hexagonal cell, or if left by itself would construct a cylindrical cell. He thought that if left alone to build a single cell, this would most probably be round. In the cells of *Melipona*, as Huber's plate shows, they are only hexagonal when in contact with the adjoining cells.

M. De Selys Longchamps, Brussels, Belgium, was elected a Corresponding Member. Messrs. Samuel H. Savage, W. Wickersham and John E. Knight were elected Resident Members.

February 7, 1866.

The President in the chair.

Thirty-eight members present.

The following paper was presented:

Observations on the Development and Position of the Hymenoptera, with Notes on the Morphology of Insects. By A. S. Packard, Jr., M. D.

The following notes form an abstract of a more extended memoir upon the changes of the insect after leaving the egg, not touching upon the evolution of the embryo.

After the larva has become full fed, as it is about to enter upon the semi-pupa state, its body undergoes the following changes: The thoracic rings and head become more elongated and fuller, so that where in the larva the under side of the anterior and posterior halves of the body are closely appressed to each other, now, the two halves begin to recede, and the grub as it lies in its cell, is but half doubled upon itself. With this important change of posture the whole body becomes more cylindrical and rounded. Thus the sides (*Arthropleuræ*) of the thoracic ring become absorbed, and do not project out from the walls of the body as in the larva; and later still, the corresponding area in the abdomen likewise almost wholly disappears.

The greatest activity, however, is observable about the cephalic portion of the body, for here the greatest differentiation of parts is to occur. The head of the pupa, already partially formed beneath the prothoracic ring, though as yet very small, by its presence still affects very sensibly the form of this region in the larva, the skin of which still remains unbroken, though very considerably distended. The whole length of the head (Fig. 1, *a*,) and prothorax (Fig. 1, *b*.) together, is now equal to the united length of the head and thorax in the larva originally. To effect this, the larval head is greatly extended forwards, and the prothorax is three times as long as before, and much narrower, the sides converging towards the base of the head. The two posterior thoracic rings are also twice as long as in the larva. On the under (sternal) side the mouth parts are also elongated, and the labium projects a little beyond the head, owing to the increased size of the mouth-parts over those of the larva.

At this period, the two pairs of wings are very equal in size, the posterior pair but little smaller than the anterior pair, and inserted much higher up the ring nearer the median, tergal line of the body; and in the succeeding stage the posterior pair are seen to be scarcely smaller than the anterior pair, and exactly parallel in their insertions, their longitudinal diameter and their tips. This change in the position of the posterior pair of wings, so important in a morphological point of view, is accompanied by a corresponding change in the proportions of the thorax. The meta-thorax has become mostly absorbed, so as to resemble more the same parts in the pupa; while the mesothorax retains much of its original proportions, though becoming more compact, and presenting less of the tergal area.

During this time the head has also greatly increased, especially in the size of the appendages; the eyes, antennæ and mouth parts begin to assume the size and shape of those of the pupa. Development here, as in the thorax, begins in the most important central parts, and proceeds outwards to the periphery.

In this stage (Fig. 1), when the mouth-parts of the semi-pupa have become solid enough to enable the larval head to be stripped off without lacerating the extremities of the appendages, the head is seen to be divided into two portions. The basal region, or body of the head, which is lodged under the prothorax of the larva, is orbicular when seen from the front, and its sides are continuous with the sides of the thorax, as is also the vertex, which is likewise of a continuous slope with that of the anterior tergal portion of the thorax. Seen from the side, there is no separation as yet between the head and thorax. The outline of the eyes is distinct, but they are not raised above the surface of the head. The antennæ, clypeus and mouth-parts, collectively, form a second anterior portion separated by a curved line from the epicranium. It is this anterior portion which lies in the larval head in this stage. The great increase of size of the appendages of the semi-pupa have forced forward the hard crust of the larval head, which suggested to Ratzeburg* the idea that the head of the pupa was originally composed of the two first rings (i. e., head and prothorax,) of the body of the larva. The antennæ are flattened down upon the surface, resting on each side of the small trapezoidal clypeus, over the front edge of which they again meet, when they are flexed upon themselves, lying on each side of the labrum with its palpi and the maxillæ. These appendages do not as yet project much beyond the antennæ, being short and papilliform, preserving the general form of the same organs in the larvæ.

At this period the elements (*sterno-rhabdites*, L. Duthiers,) compos-

*Ueber Entwicklung der fusslosen hymenopteren larven, etc. Nova Acta Natur. Curios. Tom. XVI. 1832. Westwood has fully shown the fallacy of this idea, (Trans. Ent. Soc. London. Vol. II. p. 121), and our own observations corroborate his statements and conclusions.

ing the ovipositor, lie in separate pairs, in two groups, exposed distinctly to view. The ovipositor thus consists of three pairs of slender non-articulated tubercles arising on each side of the mesial line of the body in juxtaposition. The first two pairs arise from the eighth abdominal ring, and the third pair grow out from the anterior edge of the ninth ring. The ends of the first pair scarcely reach beyond the base of the third pair. With the growth of the semi-pupa, the terminal or tenth ring decreases in size, the tip of the abdomen is gradually incurved toward the base, (Fig. 2), and the three pairs of rhabdites approach each other so closely that the two outer ones completely ensheath the inner, until a complete distensible tube is formed, which gradually is withdrawn entirely within the body (see Fig. 4). The male genital organ is originally composed of three pairs of non-articulated tubercles all arising from the *ninth* abdominal ring, being sternal outgrowths, and placed on each side of the mesial line of the body, two being anterior, and very unequal in size, and the third pair nearer the base of the abdomen. Thus in their position, the three pairs of tubercles destined to form the male intromittent organ can not be said to be strictly homological with the female ovipositor; nor can the external genital organs be considered as in any way homologous with the limbs, which are articulated outgrowths budding out between the sternal and pleural pieces of the *arthromere**. This view will apply to the genital armor of all insects, so far as I have been able to observe. It is so in the larva of Agrion, which completely repeats the structure of the ovipositor of Bombus in its essential features detailed above. Thus in Agrion the ovipositor consists of a pair of closely appressed ensiform processes which come out from under the posterior edge of the eighth abdominal ring, and are embraced between two pairs of thin lamelliform pieces of similar form and structure, arising from the sternite of the ninth ring. These sternal outgrowths do not homologize with the long filiform antennæ-like, jointed appendages of the tenth ring, as seen in the Perlidæ and most Neuroptera and Orthoptera, which, arising as they do from the arthropleural, or limb-bearing region of the body, i. e., between the sternum and episternum (or lower pleurite) are strictly homologous with the abdominal legs of the Myriapoda and the "false legs" of caterpillars. So that in these genito-sensory appendages, we perceive faint tracings of the idea of antero-posterior symmetry first observed in vertebrates by Oken, and more recently by Professor Wyman,

*This term is proposed as better defining the ideal ring, or primary zoological element of an articulate animal than the terms *somite* or *zoönite*, which seem too vague; so also the term *arthroderm* for the outer crust or body walls of articulates, and *arthropleura* for the pleural or limb-bearing region of the body, being that portion of the arthromere comprised between the tergite and sternite.

and Dr. B. G. Wilder, involving a repetition of homologous appendages at the two opposite poles of the body. The broad leaf-like appendage to the tenth ring in Agrion, seems homologous, both in function and structure, with the respiratory lamellæ of the swimming abdominal limbs of the lower decapodous crustacea and the tetradecapods, which perform the function of gills.

During this stage, the basal ring of the abdomen of Bombus (Fig. 2, *c*,) is plainly seen to be transferred from the abdomen to the thorax with which it is intimately united in the hymenoptera. This we deem the most essential zoölogical character separating the hymenoptera from all other insects. This transfer of an entire arthromere from one region to that next in front, involving the remodelling of the entire form of the insect, though not uncommon in the crustacea, is, in the class of Insects, peculiar to the higher families of the hymenoptera; as in the lowest, the Tenthredinidæ, the transition is but partial, corresponding to the Lepidoptera in this respect. It is an instance of the principle of cephalization advanced by Professor Dana, so fully illustrated in the crustacea, where occur in some groups changes in the primitive number of arthromeres, proved by the inconstant number of rings (arthromeres) forming the abdomen, and cephalo-thorax respectively. This transfer of the zoölogical elements from the posterior end of an animal towards the head, involving in this act the entire reconstruction of the animal form, lies at the basis of all sound classification, and is a principle which must be followed by every student dealing with the classification of the larger divisions of the animal kingdom.

So intimately united with the thorax is this elemental ring, that from its sculpturing, its coloration, and, in fine, its close mimicry of the normal thoracic segments, our best observers have united in calling it the metathorax, and homologizing it with that ring in the lower insects. Latreille and Audouin considered it as the basal ring of the abdomen, as did Newman, who termed it the *propodeum*. But our best hymenopterists of thirty years' standing consider it to be the metathorax, with the exception of Baron Osten Sacken in his articles on the Cynipidæ.* During the autumn of 1863, when the observations here recorded were made, our attention was drawn† to this part. At this period the thorax is one-third smaller than in the pupa. The position of the three thoracic spiracles can be easily discerned. On the two posterior rings of the thorax they are seen situated in their respective "peritremes" (Audouin), which pieces lie at the base, and

* Proceedings of the Entomological Society of Philadelphia. Vols. II, III.

† Proceedings Essex Institute. Vol. IV. The Humble Bees of New England and their parasites; etc. Communicated April 23, 1864. p. 3. Note.

just under the insertion of the wings, on the posterior half of the ring while on the prothorax the peritreme lies contiguous to and partially under the posterior edge of the vascular tubercle, which in position is exactly homologous to that of the wings.

It is thus demonstrated that the wings grow forth, first as vascular sacs, through the *arthroderm*, just above the line of spiracles, and at the line of juncture of the lower edge of the tergite, and upper edge of the upper pleurite, or epimerum; while on the other hand the limbs grow out through the line of juncture of the sternite and the lower pleurite, or episternum.

In what may be termed the third stage (Fig. 3), though the distinction is a very arbitrary one, the change is accompanied by a moulting of the skin, and a great advance has been made towards the pupa form, (Fig. 4). There are seen to be two distinct regions to the body. The more anterior consists of the head and thorax, which are placed closely together; and the abdomen, which is separated from the rest of the body by a deep constriction. We cannot fail to be at least reminded of the biregional crustacean, an analogy which Oken has called attention to, and which has been successfully used by that author in comparing the pupæ of insects with Crustacea.

At this period the mode of sloughing of the larval skin is well shown. Instead of the violent rupture of the skin at one point on the tergum of the thorax, as in the majority of insects, accompanied with the great exhaustion consequent on the act, which makes the operation a perilous one to most insects and crustacea, in this species, and most probably all the hymenoptera which at this stage have a soft tegument, the skin breaks away gradually in shreds, from the tension due to the unequal growth of the different parts of the body. Thus after the skin beneath has fully formed, shreds of the former skin remain about the mouth-parts, the spiracles and anus. Upon pulling upon these, the lining of the alimentary tube and tracheæ can be drawn out, sometimes, in the former case, to the length of several lines. As all these internal systems of vessels are destined to change their form in the pupa, it may be laid down as a rule in the moulting of insects and crustacea, that the lining of the internal organs, which is simply a continuation of the outer tegument, or *arthroderm*, is, in the process of moulting, sloughed off with that outer integument.*

Where before the head and thorax together were but little more than one-half as large as the abdomen, now they are conjointly nearly equal in size to the abdomen. (Fig. 3.) The greatest changes have gone on in the two anterior regions of the body. They unitedly tend

*It remains yet to be proved whether the biliary tubes, salivary glands and inner genital glands and cavities, form exceptions to this rule.

to assume a spherical form, while the elongated abdomen is shortened and very perceptibly altered in form, approaching near that of the pupa, while the whole body is flexed more upon itself.

The head is still closely appressed to the prothorax, but much less so than formerly, since the increasing size and different proportions of the prothorax have pushed it away. This act of separation has effected an important change in the position of the head as related to that of the rest of the body. It is now truly vertical. Before, its greater length was more continuous with the longitudinal axis of the body, that is, nearly horizontal, or rather inclined at a slight angle from the longer axis. The horizontal position is normal in the lowest insects, as the neuroptera. In the hymenoptera, the longer axis of the head is most completely vertical.

The head in its size, and the development of the appendages, including the mouth-parts, now begins to resemble those parts in the pupa. The eyes are larger and more distinct than before, the maxillæ and antennæ, though still very short, are shaped more like those parts in the pupa. In the antennæ, the most marked change takes place in the three basal joints, or the "scape," of which the second joint now becomes the longest and somewhat contracted in the middle, and round at the extremity; while the terminal joints are still doubled upon themselves, and rest folded upon the mouth-parts.

The thorax also resembles that of the pupa, though longer, and the basal ring of the abdomen (propodeum) is still exposed to view when seen from above. At this stage the præscutum of the mesothorax, before very distinct, is no longer seen, as in the pupa it is mostly absorbed, and passes out of sight, though in the Tenthredinidæ it is a large and conspicuous portion of the mesonotum.

Most interesting changes have occurred in the hinder part of the thorax. Where in the previous stage the meso-scutellum was immersed in the ring to which it belongs, it is now elevated, and become very prominent, the thorax posteriorly falls rapidly away from it at an angle of about 60°, and its hinder edge is much thickened and folded down on itself. The metathorax is entirely visible from above. The scutum is now entirely separated into the two lateral halves, being transversely narrow, triangular pieces, the bases of which are square and closely adjoin the insertion of the hind wings, while their apices are much produced, and extend under the meso-scutellum. The meta-scutellum is now distinctly seen to be a linear transverse piece reaching on each side to the middle of each half of the scutum. The basal ring of the abdomen (propodeum, Fig. 3, *c*,) is now undergoing the process of being transferred from the abdomen to the thorax. Where before it was a segment much narrower than those contiguous, it has now become still smaller, and its tergal portion instead of being nearly horizontal, is now much inclined downwards posteriorly.

The abdomen, though still larger, approaches much nearer the form of the pupal abdomen than before, and the segments are flatter. The second ring has become much contracted, as it is destined to become the "pedicel" or "1st abdominal segment" of descriptive entomology. There is now a differentiation of the elements of the ring. Thus the tergites (notum, Fig. 3, *f*.) are clearly distinguished from the pleurites (Fig. 3, *e*, flanks.) and *urites* (L. Duthiers, Fig. 3, *d*, ventral side). The spiracles are situated on the upper edge of the pleurites, opening out just under the edge of the tergite. As we go back towards the tip of the abdomen, the tergites, as well as the urites, decrease in width, while the pleural region or pleurites increase in size. It is the pleural portion however which is afterwards to become absorbed, by which the dorsal and ventral portions of the abdomen approximate more intimately, and overlap each other, thus making the tip acute, as in the pupa (Fig. 4), and especially the perfect bee.

During this time the ovipositor, owing to the diminished size, by absorption, of the parts supporting it, has become gradually more and more retracted, while the entire tip of the abdomen is more acute and incurved.

THE PUPA STATE.

In this stage (Fig. 4,) the whole body is shorter, and there is a decided transfer of the bulk of the body towards the head. The head has increased in size, the thorax is one-third larger, while the greatly shortened abdomen is a third shorter than in the preceding stage. At this period the longitudinal axis of the body is less curved than before. The meso-scutellum is now placed just in the middle of the body, when before it was situated at the anterior third. This change also carries the wings far back to the middle of the body, from their previous situation very near the head, and on the anterior third of the body. The limbs are greatly enlarged; the tarsi of the hind pair now reach near the tip of the abdomen, where before they were simply folded upon the thorax, not reaching to, or resting upon the abdomen.

Great changes have occurred in the appendages of the head. The clypeus, labrum and mandibles are now exposed to view. The antennæ have become straightened and greatly elongated, and a corresponding change has occurred in the maxillæ and labium with its palpi, which now reach to the middle of the abdomen, while the lingua extends as far as the seventh abdominal segment. This stage, therefore, is characterized by important modifications in the size and position of the extremities and appendages of the head, thorax and abdomen. In the thorax the changes are not especially remarkable.

The scutellum is now in contact with the base of the abdomen, as if the whole thorax had been carried backward, and the entire abdomen brought forwards and upwards, due to the absorption of the metathoracic ring and basal ring of the abdomen.

Thus each of the three regions of the body is a centre of development, the gradual perfection of the appendages belonging to each region proceeding from the centre towards the periphery; beginning at the insertion of the limbs to the trunk, and gradually perfecting their development towards the extremity. Hence the wings, the tarsi, or terminal joints of the limbs, and the abdominal appendages, are the last to be developed and perfected. The anterior part of the thorax is perfected earlier than the posterior; while in the abdomen, the development goes on from behind forwards. Prof. Dana has shown that in the Crustacea the cephalothorax and abdomen are each a distinct centre of development, in which progress reaches to a wider or narrower circumference in different species.* Researches on the embryology of the higher Annelids show that the development of worms proceeds from a single centre.†

At this stage, which may be properly called the pupa state, the eyes begin to turn dark, and a few hairs develop themselves upon the upper side of the abdomen; but the stage is so transitory that in a long series of individuals it is impossible to select a single individual, and denominate it a *pupa*, since there is no pause in the metamorphosis for a special biological design, such as obtains in the Lepidoptera and majority of lower insects. The terms larva, pupa, and imago, are not therefore absolute terms.

SUBIMAGO STATE.

Certain individuals which would upon a casual glance be mistaken for "pupæ," differed so much from what we have called pupæ above, that they may be said to be analogous to the *subimago* state of Ephemeridæ. In this state the arthroderm, owing to the rapid deposition of chitine, is more dense and harder; the wings are as large as in the perfect bee, and the joints of the legs are spiny, while the ovipositor has become wholly withdrawn within the walls of the abdomen.

In some specimens, remains of a thin pellicle were found upon the extremities; so that we are neither justified in calling this individual an *imago*, or on the other hand, a *pupa*. The individuals had not left their cells. Their feet had not yet been used for purposes of

* Introduction to the Crustacea of the U. S. Exploring Expedition. Vol. 1. p. 22.

† See S. Lovèn. K. Vetenskaps, Acad. Handl. 1840. Wiegmann's Archiv, 1842. Part I. M. Sars. Development of Polynoë cirrata. Wiegmann's Archiv, 1845. Part I. Milne Edwards. Annales Science Nat. 1845.

locomotion, nor their jaws to assist in making their way out of their cells, while the hairs are nearly concolorous all over the body, though very faintly shaded with yellowish on the dorsal and lateral portion; so that the *species* can be distinguished, as some of the specific characters depending on ornamentation are at this time apparent. We have observed facts indicating three moultings of the skin during the so-called pupa state, in distinction from the *larva* and *imago* state, and it is highly probable that there are more. During the larval condition it would be safe to say that there are *four* distinct moultings, as there are five distinct sizes of larvæ. In some of the eggs the larval forms can be indistinctly seen, through the thin walls which we would homologize with the skin of the insect after birth, for the *fertilized* egg must be considered as the insect in its inception, in a state equivalent to the larval, or pupal, or perfect state of the insect. The genus Bombus, therefore, may be considered to undergo a series of at least ten moultings of the skin, and we are inclined to think farther observations will tend to increase the number. Lubbock* has described twenty in Ephemera, and five have been noticed in several genera, such as Meloë and others.

The sexes of the larvæ can be easily distinguished, as the genital armor appears through the transparent skin.

The specific differences between the larvæ of the different species of Bombus are of the slightest possible amount, as they only differ in size, the rings of the body being smooth or rough, and in having more or less clearly defined sutures between the pieces composing the head. The eggs of the different species compared presented no appreciable differences.

In the pupa state, the two sizes of male, female and workers can be more readily appreciated than in the imago state, as the insects can be more easily measured and comparisons made. Corresponding cases of dimorphism in other insects will probably be studied to great advantage when the insects are observed at this period of life. Between the two sizes of the ♀ in the pupæ of *Bombus fervidus*, there was a difference of .05 inch, and in the ♂ .03 inch. In a number of the worker pupæ of *Bombus separatus*, there was a difference of .04 inch between the two broods of workers, the more advanced brood being smaller, and not only shorter, but also narrower.

In this connection, we would present some views relative to a theory of the number of arthromeres composing the head of insects (*hexapoda*), and the number and sequence of their appendages, suggested by studies of the larval forms of hymenoptera, and especially the lower Neuroptera, not omitting insects belonging to other sub-

* Transactions Linnæan Society. Vol. XXIV. Part ii. 1863.

orders, and some forms of Crustacea. After Savigny had shown that the mouth-parts of Insects and Crustacea were jointed appendages like those attached to the thorax, and therefore repetitions of an ideal jointed limb or appendage, Audouin proved that in the ideal arthromere, of which the bodies of all articulata are a congeries, arranged in a longitudinal series, the periphery should be distinguished into an upper, (*tergite* Duthiers) lower (*sternite* Duthier) and pleural part; that in the thorax the legs were thrust out between the pleurite and sternite, and the wings grew out between the pleurite and tergite. The arthro-pleural region is therefore the limb-bearing region of the body, and the different parts of the ideal ring are developed in a degree subordinate to the uses of the limbs and wings. Thus in the walkers, such as the Carabidæ, the pleural and tergal regions are most developed; while in those insects such as the Dragon-flies, which are constantly on the wing, and rarely walk, the pleural region is enormously developed, and the tergites and sternites attain to their minimum development. The muscles used in flight are greatly increased in size over the atrophied muscles brought into requisition by the act of walking. In the Hymenoptera, however, which are both walkers and fliers, the three portions of the ring are most equally developed.

These parts of the arthromere are simplest in the abdomen; and become more differentiated in the thorax, where the numerous pieces composing them have been classified and named mostly by Audouin, McLeay, and Lacaze-Duthiers. Scarcely an attempt has been made to trace these parts in the rings of the head by those who have proposed theories of the number of arthromeres in the head of insects.

As we can understand the structure of the thorax better after studying the abdomen, so we can only homologize the different head pieces after a careful study of the thorax of insects, and the cephalothorax of Crustacea; which thus afford us a standard of comparison.

Since the arthropleural is the limb-bearing region in the thorax, it must follow that this region is largely developed in the head, to the bulk of which the sensory and appended digestive organs bear so large a proportion, and as all the parts of the head are subordinated in their development to that of the appendages of which they form the support, it must follow logically that the larger portion of the body of the head is pleural, and that the tergal, and especially the sternal, parts are either very slightly developed, or wholly obsolescent. Such we find to be the fact. As to the number of rings composing the head, it is evident that it is correlated with the number of appendages they are to support. Hence, as in the thorax there are three rings, bearing three pairs of appendages or legs, it follows that in the head where there are seven pairs of appendages, there must be seven rings.

That there are seven such appendages, among which we would include the eyes, which, if not homologous with the limbs, or more properly speaking, repetitions of the ideal appendage, are at least their equivalents, in that they are situated on a distinct ring, as are the ocelli which are exact equivalents or repetitions of the eye, is evident.

The larvæ of Ephemera and Libellula, in the head of which these parts of the cephalic rings by reason of the degradational character of the insects appear in their simplest forms, afford us the best material for study. In the head of the larva of Libellula we have observed that the greatly elongated labium, masking, when at rest, the mandibles, is in reality composed of three *sternites*, immersed in, and surrounded by three *pleurites*, all bearing appendages, the basal pair being the mandibles, the middle pair maxillæ, and thirdly, the pair of labial palpi, all of which are placed behind the mouth-opening. Beyond, and in front of the mouth, are successively placed the sensory organs; the antennæ, the pair of eyes, and what we must consider as two pairs of ocelli, since the early forms of Ephemera, and the early stages of Bombus, show the three ocelli resting on three separate pieces; the two posterior pieces (*pleurites*) forming a pair, while the single ocellus in advance is placed on a triangular piece, which we consider as two pleurites united on the median line of the body, as the ocellus has a double form, being broad, transversely ovate, and not round, as if resulting from the fusion of two originally distinct ocelli.

The antennæ* by their form and position naturally succeed the labial palpi. Considering how invariably in the Crustacea the eyes are situated in front of the gnathopods, we feel convinced that the same position must be allowed them in the head of insects. This will bring the ocelli most in advance of all the other appendages. The bulk of the head of insects must then be formed by the great expansion of the eye-pleurites, which, so to speak, are drawn back like a hood over the basal rings, while the rings bearing the maxillæ and labial palpi and the antennary ring, are thrust out, telescope-like, through the large swollen eye-ring; as in Decapods, a single ring covers in the aborted rings composing the rest of the cephalo-thorax, as Edwards and Dana have shown, and our own investigations have taught us. Thus the upper surface of the head is composed of expansions of the pleural pieces of the ideal arthromere which never develops the sternal,

*Repeated observations have taught us that the idea advanced by Zaddach (Untersuchungen über die Entwickelung und den Bau der Gliederthiere), and adopted by Claparède (Recherches sur l'Évolution des Araignées), that the antennæ of the larvæ are not homologous with those of the perfect insects, is untenable. In the larvæ of all hymenoptera and numerous families of Lepidoptera and Neuroptera, they are identical in position in all stages of development.

or probably the tergal portions in front of the mouth. Thus each region of the insectean body is characterized by the relative development of the three elements of the arthromere. In the abdomen the upper (tergite) and under surfaces (sternite) are most equally developed, while the pleural line is reduced to a minimum. In the thorax the pleural region is much more developed, either quite as much, or often more than the upper or tergal portion, while the sternite is reduced to a minimum. In the head the pleurites form the main bulk of the region, the sternites are reduced to a minimum, and the tergites are almost entirely aborted, or may perhaps be identified in the centre of the "occiput," or what is probably the mandibular (or mandible-bearing) ring, and in the "clypeus."

In the abdomen the same abolescence of parts strikingly exemplifies what may be called the law of systolic growth, where certain parts of the zoölogical elements of a body are in the course of development either greatly enlarged over adjoining parts, or become wholly obsolete, as stated by Audouin and St. Hilaire, who ascribed it to the principle of "arrest of development," which is now used by physiologists in a more limited sense. While, as we have shown above, the genital armor of insects is not homologous with the limbs, there are, however, true jointed appendages attached to the ninth or tenth abdominal rings, or both, which are often antennæ-form, and serve as sensorio-genital organs in most neuroptera and orthoptera. The abdominal limbs are confined as a rule to the two lower suborders of insects, and are homologous with the "false legs" of the larva of Lepidoptera, the abdominal legs of Myriapoda, and, we believe, with the three pairs of abdominal appendages or spinnerets of the Arachnids. As in the most anterior rings of the head, so in the terminal abdominal rings, there only remain minute portions of the arthromere, which are tergal pieces, the other two elements of the ring being rarely present, or entirely aborted. The two opposite poles of the body are therefore fashioned according to the same laws, and are morphologically simply repetitions of each other.

In conclusion, we consider that twenty rings (arthromeres), as a rule, compose the bodies of insects, of which seven are contained in the head, three in the thorax, and ten in the abdomen, and that as thus grouped, forming three distinct regions, the insects differ from all other articulates, standing as a class above the Crustacea and Worms. The arachnids and myriapods, as Mr. Scudder* has shown, agree with the insects in possessing a distinct head separated from the thorax or "pseudo cephalo-thorax," so that the Myriapoda do not form a class by themselves equivalent to the Crustacea, or Worms, or

* These Proceedings, Vol. IX, p. 69. May, 1862.

Insects, but with Leuckart, Agassiz and Dana, we would prefer to rank them as an order of the class Insects.*

In a former communication,† we proposed a classification of insects into two series of Suborders, (not however agreeing with the Haustellata and Mandibulata of Clairville,) of which the lower begin with the Neuroptera, and by the Orthoptera and Hemiptera culminate in the Coleoptera, while the second series rank higher as a whole, beginning with the Diptera and ending with the Hymenoptera, which thus stand at the head of the Articulata. The hymenoptera differ from all other insects in having the basal ring of the abdomen thrown forward upon the thorax; in having the three regions of the body more distinctly marked, and more equally developed than in other insects. The mouth-parts are more equally developed, and at the same time more differentiated in structure and function; there are no abdominal jointed appendages present in the adult form, while the external generative organs are more symmetrically developed, and more completely enclosed within the abdomen in the highest families, than in any other suborder of insects. They afford the highest types of articulates, being more compact, less loosely put together, and thus presenting less degradational features than any of the other suborders; but the most valuable *single* character is the transfer of the first abdominal ring forwards to the adjoining region, which involves an entire remodelling of the body, throwing *forwards* the prime elements of the organism, by which it becomes more cephalized, and thus the nervous power rendered more centralized than in all other articulates.

Selecting the Honey bee as the type, being in our view the most perfectly organized of all insects, we find the head larger and the abdomen smaller in proportion than in other insects, accompanied with the most equable and compact development of the parts composing these regions. The brain-ganglia are largest and most developed according to the studies of entomotomists. The larvæ, in their general form, are more unlike the adult insects than in any other suborder of insects, while the pupæ most closely approximate to the imago. They are short cylindrical, footless, worm-like grubs which are help-

*The Embryology of Arachnids as worked out by Claparède, shows that the larva is strikingly worm-like, distinct rings ("protozoönites") appearing before the biregional arachnid form is assumed. The embryos of two genera of mites, Demodex and Acarus, are at first hexapodous, as Newport has shown that of Julus, a myriapod, to be. The close homologies of the Arachnids and Myriapods with the Insects (Hexapoda) convince us that the three groups, whether we call them orders or classes, are as a whole equivalent to the Crustacea or Worms.

† Synthetic Types of Insects. Boston Journ. Nat. Hist. VII. 1863. How to observe and collect Insects. 2d Annual Report of Maine State Survey. 1863.

less, and have to be fed by the prevision of the parents. In undergoing a more complete metamorphosis than any other insects, in the unusual differentiation of the sex into males and females and sterile females, or workers; with a further dimorphism of these three sexual forms, and a consequent subdivision of labor among them; in dwelling in large colonies, thus involving new and intricate relations between the individuals of the species and other insects, their wonderful instincts, their living on the sweets and pollen of flowers, and not being carnivorous in their habits, as are the Neuroptera, and a large proportion of the Orthoptera, Hemiptera, Coleoptera and Diptera, and their relation to man as a domestic animal, subservient to his wants,—the bees, and hymenoptera in general, possess a combination of characters which are not found existing in any other suborder of insects, and which we must believe, rank them first and highest in the insect series.

Likewise the hymenoptera are more purely terrestrial insects than all others. The Neuroptera are, as a whole, water insects, their larvæ live in the water, and the perfect insects live near streams and pools; the Orthoptera are more terrestrial; among the Hemiptera are numerous aquatic species, as there are in all the other suborders except the hymenoptera, of which only two genera are found swimming in the adult state on the surface of pools, and they are the low minute Proctotrupids, *Prestwichia natans* and *Polynema natans* Lubbock. As we have previously shown, the Hymenoptera do not imitate or mimic the forms of other insects, but on the contrary, their forms are extensively copied in the Lepidoptera and Diptera especially. There are synthetic types or mimetic forms which bind these suborders into a single series. As the Coleoptera, Hemiptera, Orthoptera and Neuroptera are bound together by homomorphous or mimetic forms into a series by themselves, so the Hymenoptera, Lepidoptera and Diptera, possess their synthetic types linking them together.

Another and very accurate method of determining the relative rank of the larger groups in nature, is by comparing the degradational forms occurring in each group. Among the Neuroptera the lowest wingless forms, such as Lepisma and allies, most strikingly resemble the myriapods, in the great equality in the size of the arthromeres composing the body, and the slight distinctions preserved between the three regions into which the body is divided. The largest, most vegetative, monstrous and bizarre forms of insects are found among the Neuroptera and Orthoptera. Among Hemiptera the parasitic wingless lice, and among Coleoptera the low Meloë and Stylopidæ, afford instances of a genuine complete parasitism such as obtains more fully among the low crustacea and worms. While we find the degraded types of insects belonging to the lower series of suborders, present elongated, worm-like, myriapodous forms, in ascending to the second and higher series of suborders, the lowest wingless dipterous Pulex assumes a much compacter, more cephalized form, while in the wingless Chionea, which wonderfully mimics the higher Arachnids, there is a still greater concentration of the arthromeres. This concentration of the body progresses towards a higher type in the degradational forms of the Lepidoptera, such as the wingless females of Orgyia, Anisopteryx, and Hybernia. In ascending to the wingless hymenoptera, such as Pezomachus, Formica and Mutilla, there is a closer approximation to the winged normal form of the suborder. While in the lower insects the loss of wings involves apparently a total change in the form of the body, in the hymenoptera this change is remarkably less than in any other insects, and the tri-partite form of the insectean body is more strongly adhered to.

Again, in the degradational winged forms of the hymenoptera, we find the antennæ rarely pectinated, a common occurrence in the lower suborders; also the wings of the minute Proctotrupidæ are rarely fissured, and when this occurs they somewhat resemble those of Pterophorus, the lowest Lepidoptera, and in but a single hymenopterous genus, Anthophorabia, are the eyes in the male sex replaced by simple ocelli, like those in Lepisma and other degradational forms of the lower insects.

What we know of the geological range of insects proves that the hymenoptera were among the last to appear upon the earth's surface. The researches of Messrs. Hartt and Scudder prove that the earliest known forms of insects found in the Devonian rocks of New Brunswick, were gigantic embryonic, and, in fine, degradational types of Neuropterous and Orthopterous insects. The Coleoptera appear in the Mesozoic rocks, where the lower Hymenoptera first appear in limited numbers, including representatives of the Formicidæ and lower families, and with them the Lepidoptera and Diptera.

We have throughout this article spoken of the Neuroptera as a group, equivalent to the Orthoptera, or Hemiptera, or any other of the suborders of insects. We believe thoroughly in the Neuroptera as limited by the early entomologists. The Odonata are the types of the suborder, and the Termitidæ, Psocidæ, Phryganeidæ, Perlidæ, Hemerobiidæ, Sialidæ, Panorpidæ, Libellulidæ (Odonata), Ephemeridæ and Thysanura, are closely interdependent groups, and circumscribed by the most trenchant characters, which they possess in common, and which separate them from the closely allied Orthoptera, into which, by modern German authors especially, some of their families appear to us to have been unwarrantably merged.

The families of this suborder differ more among themselves than those of other suborders, by reason of the lowness of their type, presenting an unusual number of degradational forms, the connecting links of which have become, we must believe, extinct. The Neuroptera are moreover true synthetic types, combining, as do all decephalized, embryonic forms, the structure of several equivalent groups, presenting features which remind us of characters more fully wrought out in higher and more compactly finished groups of insects.

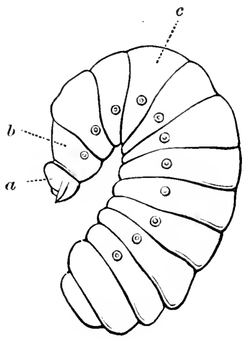


Fig. 1.

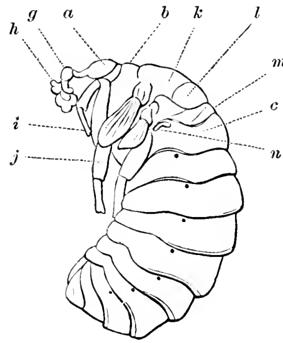


Fig. 2.

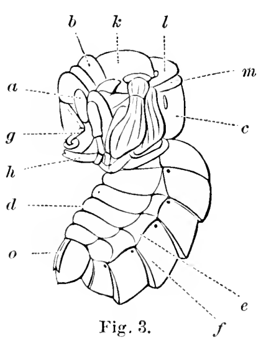


Fig. 3.

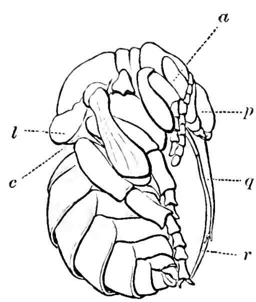


Fig. 4.

DESCRIPTIONS OF THE FIGURES.

Fig. 1. *Bombus ferridus.* The first stage of the semi-pupa concealed by the larval skin. The semi-pupa head lies under the head (*a*) and the prothoracic ring (*b*). The basal ring of the abdomen (*c*) or fourth ring from the head is unchanged in form. This figure also will suffice to represent the larva, though a little more produced anteriorly than in its natural form.

Fig. 2. *Bombus fervidus.* The second stage of the semi-pupa. The larval skin entirely sloughed off, the two pairs of wing pads lying parallel, and very equal in size, like the wings of Neuroptera. The thoraco-abdominal ring or propodeum (*c*), with its oblong spiracle (*n*), essentially differing from those on the abdomen. At this point the body contracts, but the head and thorax together are yet, as still more in the previous stage, much smaller than in the pupa, and there is still a continuous curve from the tip of the abdomen to the head. *g.* antenna; *h.* lingua and maxillæ and palpi; *i.* fore legs; *j.* middle legs; *k.* meso-scutum; *l.* meso-scutellum; *m.* meta-scutellum; *n.* spiracle of the propodeum.

Fig. 3. *Bombus fervidus.* The third stage of the semi-pupa. The head and thorax together now nearly equal in size the abdomen, the propodeum (*c*), has become entirely transferred to the thorax. The head has become greatly enlarged; the rings are very unequal, the hinder pair are much smaller, and overlaid by the anterior pair; the three terminal pair of abdominal rings so large in Fig. 2, have been absorbed, and partially enclosed in the cavity of the abdomen; and there has been a further differentiation of the ring into the sternite (*d*), pleurite (*e*), and tergite (*f*). *a.* eye; *h.* lingua; *o.* ovipositor, two outer rhabdites exposed to view. The abdominal spiracles in Fig. 2 and 3, are represented by a row of dots. In the pupa (Fig. 4), they are concealed by the tergites.

Fig. 4. *Bombus fervidus.* The pupa state, where the body has become much shorter, the appendages of the head and thorax greatly differentiated; the external genital organs wholly retracted within the cavity of the abdomen; the head freer from the body, and the whole bulk of the head and thorax together, including the appendages, greater than that of the abdomen. *c.* the propodeum nearly concealed in a side view; *p.* labrum; *q.* maxillæ, with the two-jointed palpi at the extremity; *r.* tip of the lingua.

Dr. F. H. Brown remarked on a case of intra uterine amputation which had come under his notice. A boy of twelve or fourteen years had one arm thus amputated at the middle of the fore arm; on the stump were three fingers, consisting of three joints; but the presence of the ulna and radius could not be detected.

Mr. F. W. Putnam exhibited a specimen of a malformed eel which was found in Lynn, in a well which was left dry during the drought of 1865. Its head was greatly shortened and widened, and the eyes enormously developed; while the pectoral fins were enlarged three or four times their normal size.

Professor Wyman remarked that this specimen had evidently retained the proportions of the head belonging to embryonic life; that the short and broad form of the head and large eyes were occasionally met with in the four classes of vertebrates. He had observed several instances among deformed calves; and in Buenos Ayres there was a breed of cattle in which this shape of the head existed. A similar form of the head had been noticed among birds, but was most commonly met with in fishes and mammals. These forms were all embryonic.

Mr. H. Mann made a communication on the flora of the Hawaiian Islands, pointing out its strong relationship to the Australasian and southern Polynesian Floras, and speaking of the very large amount of trees and woody plants in proportion to the herbs found in this group.

The following gentlemen were elected Resident Members: Messrs. H. P. Bowditch of Roxbury, J. Ingersoll Bowditch and L. N. Elliot of Boston.

February 21, 1866.

The President in the chair.

Thirty-five members present.

The following paper was read:

Notes on the Modifications of Oceanic Currents in Successive Geological Periods. By N. S. Shaler.

In the following notes it will be assumed that all oceanic movements, of sufficient magnitude to form efficient agents in the distribution of life, or of sedimentary materials, are to be attributed to the friction of atmospheric currents upon the surface of the waters. The theory which has assigned to the difference of temperature of tropical and polar regions the chief agency in the production of oceanic streams, is neglected, for the double reason that the cause has been demonstrated to be entirely inefficient to produce any thing but the most inconsiderable movement, and that the effects are of a totally different nature from any which could be produced by such means.*

Although it is not yet possible for us to unravel the complicated problems involved in the changes of oceanic currents in former geological periods, we may still be able to form some general conception of the character of these streams in certain conditions of the surface, which will aid to a slight extent our understanding of past changes of the earth's surface.

It is eminently probable that the first condition of the ocean was that of a nearly, if not quite unbroken expanse of a much more uniform depth than is presented by the sea areas of the present day. This being the case, we would have a far less complicated system of oceanic circulation than at the present time. The absence of land areas would be attended by a great equality in atmospheric movements. The trade winds, which in the present condition of the earth's surface are greatly disturbed by the action of the land, would in an unbroken ocean have every where the same regular character which they now exhibit only in the Pacific Ocean, at considerable distances from the shore. This would give to the great equatorial movement, the source of all oceanic streams, the character of a great encircling current moving for its whole course within, or nearly within, the tropical limits. The regions to the north and south of the belt of trade winds being, as now, the seat of conflicting atmospheric movements, we could have no definite oceanic currents other than the single intertropical stream. The movement of water from the equator to the poles, to compensate for the surface flow of water towards the equator, due to the meridional element of the motion of the trade winds, would be accomplished most probably by a general movement of the deeper waters rather than by defined currents. In this case the rate of motion of this counter current would be so slight that it could have no considerable influence on the distribution of life or sedimentary materials, and comparatively little effect on the equalization of the distribution of heat.

If we consider the effect of ocean currents when complicated by the action of land masses, as at the present day, their varied character, important influence on the distribution of heat, and effect on rainfall, we perceive that the transition from the condition of a single equatorial current to the existing complicated system of streams could not be without an important effect upon all those circumstances which regulate the distribution of life, or the deposition of sedimentary materials. While the tropical current continued unbroken, the oceanic movements could exercise but little influence on the distribu-

*See J. F. W. Herschel, Phys. Geog. Edinburgh. 1862. p. 52.

tion of heat, and all the lines indicating equal intensity of meteorological phenomena would want the irregularities now given to them by oceanic streams. As far as temperature affects the distribution of organic life, this assemblage of circumstances would doubtless favor the existence of faunæ having their boundaries more nearly determined by latitude than at the present day. Within the limits of the equatorial current, there would exist other influences than equality of temperature tending to influence the distribution of life. As far as a powerful current moving always in the same latitude, could tend to equalize the animal and vegetable contents throughout the course swept by its waters, we would expect to find uniformity in the life of the intertropical region. We can not safely assert that perfect uniformity in the zoölogical characteristics of this region would be the result of such a current. It seems improbable that the ocean floor could long exist before such differences in depth would arise from the corrugation of the crust that bathymetrical distribution of the organisms within contained would be necessary. This and other actions would oppose the perfect equalization of the life of this area. Nevertheless, when we consider the large number of structures which cast their progeny into the water, free to be borne with its movement until either destroyed or fixed in a suitable habitat, we can not resist the conclusion that in this first condition of oceanic streams we have a powerful agent tending to equalize the life throughout the region within the tropics.

From these considerations we may conclude that the period in the history of the earth, during which the disruption of the equatorial current was effected, must have been marked by a great alteration of climatic conditions, and the loss of a powerful agent tending to produce an uniformity in the marine life in the region of the Equator. With the elevation of the first continental barrier across the whole breadth of the tropics, we would have in place of the former encircling current two closed whirlpool-like movements, the type of all oceanic streams of the present day. With this change, the influence of oceanic movements on climate would begin. It is not necessary to suppose that the barriers should have any meridional extension beyond the diameter of the trade wind belt. As soon as the northern and southern halves of the equatorial current had been diverted from their course and turned in the direction of their respective poles, they would, in accordance with well known laws, bend to the eastward and depart more and more from a meridional course as they gained higher latitudes. Assuming that the barriers extended in a due north and south direction, it can be demonstrated that very soon after the streams ceased to be impelled to the westward by the trade winds, they would desert the shores which had deflected them from their course. This action would prevent any considerable portion of the deflected waters passing around the obstructions; indeed it seems probable that only those portions which had lost their velocity by friction against the opposing shores could pass around such obstructions and continue their equatorial path.

The effect of this last condition of oceanic circulation on marine life would be widely different from that exercised by the continuous equatorial current. While the latter favored similarity in the organic contents of the region traversed by it, and admitted the existence of identical climatic conditions over all regions of equal latitude, the condition we are now considering would tend to favor the dissimilarity of marine intertropical life in different areas, and would produce the great diversities of climate we now find in regions at the same distance from the Equator.

There are some direct effects exercised upon organic life in the divided condition of the ocean movements which are in striking contrast to the action of the continuous tropical current on vital forms. If we take any of the existing ocean streams, it is seen at a glance that in its circuit its waters and their contents, as far as unprovided with means of voluntary motion, are being constantly brought into regions of different temperatnres. If we suppose any species of animal adapted to exist in the temperature found in any one portion of the current, and casting its progeny into the ocean in their immature state, during which they would be entirely at the mercy of the moving waters, we perceive at once that it must often happen that before development advances far enough to enable the young to become fixed, they will be swept into such different conditions of temperature that they would be destroyed. By converging the temperature normal to a given point to higher latitudes, or the reverse, the north and south range of species, as far as affected by temperature, could be much greater than during the continuance of the unbroken current. Thus while the existence of the equatorial current would favor the east and west extension of forms, meridional streams would favor a greater extension towards the Poles.

While the tropical current remained unbroken, all the transporting power of the ocean would operate in a westerly direction. With the disruption of this current, we would have in temperate, boreal and austral regions, a transporting agent, competent to sweep objects in an easterly direction, the portions of the streams neighboring to the poles having an essentially eastern movement.

If we adopt the usually accepted view of the action of those forces concerned in the formation of land masses, which assigns to the continental areas and the sea the most inconstant relations, we would find it impossible to effect even the most general determination of the past history of ocean streams. If continental areas have been permanently submerged and converted into the floors of deep seas, we may thereby have lost all trace of agents capable of producing currents which ceased to exist with the disappearance of the cause. If, however, we accept the existing continents as the only great folds of the earth's crust which have ever existed, and admit that when the upfold of the continental elevations, and the downfold of the sea beds had begun, all further corrugation of the crust would result in the development of these features, we have some ground on which to base conclusions as to the geography of past periods.

Although the existing state of our knowledge of the outline of the land at successive geological periods does not admit of any very trustworthy conclusions as to the past history of ocean currents, we may still trace some of the changes of the equatorial current in certain conditions of the sea area likely to have existed as the continents were developed.

It is eminently probable that no portion of the continent of North America, of sufficient size to exercise any effect on oceanic streams, existed in intertropical regions anterior to the close of the Carboniferous period. It is equally probable that that portion of South America lying to the north of the Equator was also beneath the sea during the Palæozoic time. Therefore we are justified in the conclusion that up to this stage in the earth's history the northern section of the equatorial current had not been interrupted by the American pair of Continents. The little that is known of the geology of Northern Africa leads us to suppose that this continent could not have had that portion of its mass north of the southern line of the Sahara brought above the sea line until the Mesozoic time, if not later. The southern portion of Asia, including Arabia, Hindostan, and Siam, have presented us with no evidence of Palæozoic land. Thus it seems probable that the first great series of changes which the land and seas underwent did not destroy the northern half of the equatorial current. The condition of the southern half of the equatorial current at the close of the Carboniferous period, is much more doubtful. We have unquestionable evidences of the existence of a considerable area of Carboniferous land in Southern Brazil, and it is quite likely that the axis of elevation was prolonged northwardly, in the eastern range of that empire, giving to the Southern Continent an axis corresponding in age to the Appalachian chain. In Australia, we have evidence of the existence of extensive land areas during the Carboniferous period, and though it is not yet proven that they had a northward extension sufficiently great to break the southern portion of the stream, the direction of the axis renders it probable that the eastern shore of that continent was to a great extent elevated during the Palæozoic time.

The fact that, although our knowledge of the geology of the southern hemisphere is still very limited, two considerable areas of Palæozoic land have already been noticed, suggests the question whether the southern half of the equatorial stream may not have become broken before the close of the Palæozoic time. It may be noticed that from the direction of the axis of elevation of these two regions of Palæozoic land, the resulting currents would have necessarily been deflected southwardly, and thrown into the great southern sea, and thus would have exercised no effect on the temperature or life of the northern hemisphere. Although there exists some doubt as to the condition of the southern half of the equatorial current at the close of the first great division of the geological action, there can be no question that at the close of the Mesozoic time it had become broken, certainly at one point, by the continent of South America, and most likely by the elevation of a portion of the continent of Africa, so that since the beginning of the Tertiary period, life in the southern hemisphere has been subjected to the influences of the meridional system of currents. It will be an interesting problem for the labors of the geologists of the southern hemisphere to ascertain the relations of the organic life of the three continents during the Mesozoic and Cenozoic times, and how far their features indicate the separation into distinct oceanic basins at an early time.

At the time when the southern portion of the equatorial current had doubtless lost its original character, and become broken into three meridional streams, it seems likely that the northern half of the current still encircled the earth, probably much reduced in force by friction along shores and shoals, but still retaining the essential features of the intertropical movement, and effecting similar results. The probability of this will appear when we consider those regions characterized by Tertiary beds, and which we are justified in concluding were submerged at the beginning of the present age.

The greater part of the Peninsulas of Arabia, Hindostan, and Siam, were doubtless beneath the sea during the Eocene period; the absence of these extensive land areas would admit of the existence of the trade winds over the Indian Ocean, and the unimpaired condition of the northern half of the tropical current, which since the elevation of those regions has not had any well marked character.

Enough is known of the geology of Northern Africa to warrant the supposition that it was submerged until nearly the present day. If such was the character of the sea surfaces of this portion of the globe, it is certain that a portion of the current of the Indian Ocean could have poured through the sea of Southern Europe and Northern Africa, and portions of its waters might have come under the control of the trade winds of the Atlantic Ocean, and been forced to the eastern coast of America. There exists some palæontological evidence which could be adduced to support this view of the passage of the equatorial current from the Indian Ocean across the waters which held the life of the Tertiary period now fossil in the beds of Southern Europe; but an examination into this question would demand special considerations, not coming within the scope of this paper.

It is with regard to the period at which the northern half of the equatorial current was broken by the upheaval of the intertropical portion of the American continents, that we have probably the least satisfactory evidence. No palæontological evidence tending to prove the former connection of the Atlantic and Pacific Oceans in intertropical regions has yet been published, so far as is known to the author. But we may derive some light from a consideration of the magnitude of the elevations which have taken place along the great western axis of the American Continents since the beginning of the Tertiary period. To the north and south of the Isthmus connecting the continents, we have evidences of elevation amounting to from three thousand to six thousand feet or upwards. The whole northern coast of South America as well, gives evidence of great elevation since the Eocene period. If we examine the elevation of the existing land of the Isthmus, and compare it with the magnitude of the uplift at other points in the same range, we are forced to the conclusion that if any thing like the same rate of elevation was effected in Central America, the emergence of this region could not have accomplished the disruption of the equatorial current at this point, until the Tertiary period had been somewhat advanced.

The foregoing considerations render it probable that the great meridional streams of the Atlantic and Pacific Oceans, with their great effects on the distribution of life and of sedimentary deposits, are phenomena which have most likely been in existence, only since the beginning of the Tertiary period.

Mr. A. Hyatt made a communication upon the agreement between the different periods in the life of the individual shell, and the collective life of the Tetrabranchiate Cephalopods. He showed that the aberrant genera beginning the life of the Nautiloids in the Palæozoic Age, and the aberrant genera terminating the existence of the Ammonoids in the Cretaceous Period, are morphologically similar to the youngest period and the period of decay of the individual; the intermediate normal forms agreeing in a similar manner with the adult period of the individual. He also pointed out the departure of the whorl among the aberrant Ammonoids from its complete development among the normal forms, its final appearance as a straight tube in the Baculite, and the close connection between this morphological degradation of the whorl and the production of the degradational features in the declining period of the individual, demonstrating that both consisted in the return of embryonic or prototypical characteristics of the form, and partly of the structure.

He said that the individual was, with regard to the majority of its peculiarities, either an embryonic, an adult, or an old age form in proportion to its zoölogical rank. The earlier and simpler species were embryonic, like the young individual; the intermediate, or least embryonic in aspect like the adult or progressive period of the individual; and the later or old age forms, comparable in many respects with the old age of the individual of the progressive forms: and that this could be accounted for by the constant tendency observed in the young of the higher species, to adopt the adult, and finally the old age peculiarities of species which were lower than themselves; thus making their whole aspect more progressive, or more degradational, in proportion as the preceding, or simpler species were progressive throughout life, or began to show degradational features in their later periods.

Dr. C. T. Jackson exhibited specimens of the polished rocks of Smoky Valley, Nevada, having a brilliant, but striated, surface, looking like a porcelain glaze; a polish supposed to be the joint effect of snow and sand slides, finished up by the more delicate touch of blowing sand. This must have been effected in prehistoric times, for there is now no loose sand in the valley which could be blown by the wind.

The scratches and polish were not caused by glacial action, since they run directly down the steep slope of the mountain, and glacial grooves would course along their sides. Prof. William P. Blake of Oakland, Cal., first suggested that rocks could be highly polished by blowing sand, as appears by his statements in the Reports on the Pacific Railroad Surveys.

It is well known that blowing sand grinds the glass of the United States lighthouse on Cape Cod, and the delicate touch of sand driven by the wind would give a finer polish than could be made by any other mechanical agency. Specimens of these rocks submitted to the lapidary's wheel were found to receive a less brilliant polish.

The Corresponding Secretary read a letter from Messrs. F. H. and J. B. Bradlee, Boston, January 29th, 1866, presenting a life size portrait of Audubon, by Healy. The Secretary was requested to express in behalf of the Society, its high appreciation of this valuable gift.

The Corresponding Secretary also read the letters received since the last announcement, as follows:

From the Literary and Philosophical Society of Manchester, December 30th, 1865, the K. K. Geologische Reichsanstalt, Wien, and the Schweizerische Gesellschaft für die gesammten Naturwissenschaften, Bern, January 2d, 1866, the Royal Society of Edinburgh, January 9th, 1866, the Museum of Comparative Zoölogy, Cambridge, Mass., January 20th, 1866, the American Philosophical Society, Philadelphia, January 31st, 1866, and the Lyceum of Natural History, New York, February 7th, 1866, acknowledging the receipt of the Society's Publications; the Mannheimer Verein für Naturkunde, Mannheim, January 2d, 1866, and the K. Akademie der Wissenschaften, Wien, January 11th, 1866, presenting their publications; the Société Entomologique de Belgique, December 14th, 1865, Naturforschende Gesellschaft des Osterlandes zu Altenburg, the Oberhessische Gesellschaft, Giessen, January 2d, 1866, the Société Royale des Sciences à Upsal, January 11th, 1866, and the Société des Sciences Physiques et Naturelles du Département d'Ille et-Vilaine, Rennes, February 10th, 1866, acknowledging the receipt of the Society's publications, and presenting their own; the Royal Geological Society of Ireland, December 29th, 1865, and the Royal Society of Sciences at Upsal, January 11th, 1866, desiring back numbers of the Society's publications; the R. Accademia di Scienze, Lettere ed Arti, Modena, the Société Académique d'Archéologie, Sciences et Arts du Département de l'Oise, Beauvais, and the Cercle Artistique, Littéraire et Scientifique d'Anvers, February 10th, 1866, and the École Impériale des Mines, Paris, February 12th, 1866, agreeing to exchange publications; the Société de Biologie, Paris, February 10th, 1866, and the Civico Museo, Trieste, February 12th, 1866, agreeing to exchange publications, and requesting an exchange of specimens; the Editor of the Ibis, London, December 12th, 1865, declining to exchange publications; Prof. Nevil Story Maskelyne, British Museum, December 14th, 1865, Prof. Henry Y. Hind, Fredericton, N. B., December 25th, 1865, and Louis Janin, Jr., Virginia, Nevada, February 10th, 1866, acknowledging their election to Corresponding Membership.

The following gentlemen were elected Resident Members: Dr. J. H. Warren, Messrs. W. E. Boardman, C. P. Putnam, Edwin Burgess of Boston, and Mr. Frank C. Garbutt of Cambridge.

March 7, 1866.

The President in the chair.

Forty-two members present.

The following communications were read:

On a Mineral, resembling Albertite, from Colorado. By Prof. William Denton.

When on an exploring trip west of the Rocky Mountain Range, in July of last summer, I found, near the junction of White and Green Rivers, and probably in Utah, a series of tertiary beds of brown sandstone, passing occasionally into conglomerate, and thin beds of bluish and cream-colored shale alternating with the sandstones.

These beds dip to the west at an angle of about 20°; and cropping out from beneath them on the east, are beds of petroleum shale, a thousand feet in thickness, varying in color from a light cream to inky blackness. One bed, ten feet in thickness, which I traced for six miles, is scarcely distinguishable from the best *cannelite* of New Brunswick. In the sandstone overlying the shales, I found a perpendicular vein of bitumen resembling in lustre, fracture, and other physical characters, pure Albertite. This vein has a width of from two feet six inches, to three feet four inches; it lies between smooth walls of sandstone, and was traced by us for a distance of five miles in a nearly direct line, due west. Two more small veins were discovered parallel to the first, one south, and the other north, and each distant about a mile.

The sandstone has been eroded by water into ravines and cañons to a depth of from eight hundred to one thousand feet, and the principal vein can be traced from the top of the mountain to the bottoms of these cañons, retaining its width, but not apparently increasing it. In the sandstone I found fossil wood of deciduous trees, fragments of large bones, most of which were solid, and turtles, some of which were two feet in length, and perfect. I think the sandstone is probably of Miocene age.

In the petroleum shale, underlying the sandstones, are innumerable leaves of deciduous trees; among them I think I recognized the willow, the maple and the oak, but shall be able to speak more definitely, when the specimens which I collected arrive. Dipterous insects, resembling the musquito, and their larvæ abounded; they are in a wonderful state of preservation.

The story that these beds tell seems to be this. A large fresh-water or brackish lake existed, covering a considerable portion of western Colorado and eastern Utah. Streams carried down fine sediment and free petroleum, from numerous springs in the surrounding country, for ages; the petroleum increased in flow until the sediment of the lake became thoroughly charged with it, and the cannelite was the result. A change in the level of the country and the course of the streams is indicated by the overlying sandstones and conglomerates, nearly destitute of petroleum, and at least one thousand feet in thickness. During the time that this immense amount of sediment was being deposited, willows, maples, oaks, and many strange trees grew on the land, palæotheres and turtles swam in the waters, and clouds of insects sported over its surface. The bitumen seems to have flowed from the shales as petroleum, after their upheaval, filling crevices perhaps formed by that upheaval, and to have hardened in time into its present form.

Description and Analysis of a new kind of Bitumen. By Aug. A. Hayes, M. D.

Prof. Wm. Denton, lately returned from a geological exploration of parts of Utah and Colorado, placed in my hands for chemical analysis some fragments of bitumen, discovered by him near the junction of White and Green Rivers. The *physical* characters of this mineral connect it with the variety of cannel coal called Albertite; a fact which gives great interest to the discovery, apart from economical considerations.

In chemical composition, relation to heat and solvents, it differs from Albertite remarkably, and falls within the class of true bitumens, of which it is an important member, well characterized.

It may be viewed in another connection with some scientific interest, and it is to this relation that I purpose to call attention.

When the cannel coal of New Brunswick was discovered and described, geologists and mineralogists were unwilling to class it with known coals of the cannel kind, on account of its general resemblance to some known bitumens. Jet, from the tertiary formation, seemed to be its nearest relative, but so strong was the impression of its physical characters, that it received a distinctive name, by which it is now known. Meantime observations have multiplied over a larger surface, and in our own country, two discoveries have been made, which render the reception of a new fact less difficult.

1. The discovery, some seven years since, of the bitumen of Ritchie County, Va. This is a true bitumen, filling a chasm in the sandstones of the coal formation, without shales or clay, and the deposit is extensive above the surface, and continuous more than one hundred feet below it.

The *physical* characters of this bitumen do not differ from those of bituminous coal of the prismatic form. Geologists and mineralogists have carefully examined and pronounced it coal. In place, it is a bitumen, and all its chemical characters and composition fix it firmly in the class of bitumens.

Here we have a bitumen with the external characters of coal so distinct as to place it among the more common coals on inspection.

2. Prof. Denton has made known a most valuable deposit of oil-producing bitumen, whose external characters are exactly those of the so-called Albertite, while the mineral in place fills a fracture in the rocks, without shales or clay. Either in its bed, or in the laboratory, it is a true bitumen, differing from Albertite, as bitumens differ from coal.

I think these discoveries diminish the apparent objections urged to receiving the Albertite as a cannel coal, in the way of presenting a *coal* on the one hand which is a bitumen, and an Albertite on the other, which is also a bitumen. They show, too, the important aid which may be derived from chemical inquiries, connected with geological observations.

In physical characters, this mineral resembles the Albertite of New Brunswick. The same variety of fracture is observed, and hand specimens side by side hardly differ. Specific gravity varies from 1.055 to 1.075 ; electric by friction.

When heated it loses 0.33 per cent. of moisture, and at 340° F., begins to emit vapors of hydrocarbons, soon melts and intumesces. It expands about five times its volume in decomposing, and affords a porous brilliant coke.

It partially dissolves in the lighter hydrocarbons from coal and petroleum. In petroleum naphtha, of 39.67 per cent. of dark brown bitumen separated from residuary humus, one hundred parts afforded when distilled —

Moisture	0.33
Bitumens and Gas	77.67
Carbon as Coke	20.80
Ash	1.20
	100.00

Dr. C. T. Jackson gave a description of the mines of California and Nevada, exhibiting specimens of the gold ores of California, the silver ores of Nevada, mercury ores from New Almaden, Cal., together with specimens of the associated rocks, and showed specimens of brown bituminous coal from mines near San Francisco; asphaltum and petroleum rocks from Santa Barbara; also native sulphur from the Geyser springs, and copper ores from the "Union Mine," Calvaras County, Cal., and gave an account of their characters, and the amount of copper which they had yielded for the last few years. He also gave an account of the topography and geology of the mining regions in the neighborhood of Austin, Nevada.

E. L. Sturtevant, M. D., was elected a Resident Member.

March 21, 1866.

The President in the chair.

Thirty-two members present.

The President read a letter from J. Elliot Cabot, stating that he had been an eye witness to an attack by a *Thrasher* upon a whale, which took place about three-fourths of a mile from the shore at Nahant, several years since, thus calling into question the supposed harmless nature of this animal.

Dr. White exhibited casts of the Engis and Neanderthal crania, recently obtained by the Society, and made comparisons with the cranium from Stockton, Cal., giving a resumé of the discussions elicited by the recent discoveries in the prehistoric annals of man.

A letter was read from Mrs. B. D. Greene, presenting to the Society an engraved portrait of Sir W. J. Hooker. A special vote of thanks was passed, both for this picture, and the 39–40th parts of Von Martius' Flora Brasiliensis, which lay upon the table.

Dr. Elliot Coues of Washington, D. C., and Coleman T. Robinson, Esq., of New York, were elected Corresponding Members.

Messrs. H. W. Fisher of Brookline, and C. F. Dunbar of Boston, were elected Resident Members.

April 4, 1866.

The President in the chair.

Forty-three members present

The following papers were presented:—

Description of some new Species of the Genus Schiedea, and of an allied new Genus. By H. Mann.

Schiedea *Cham. et Schlect.*, *Char. Gen. Emend.*

Calyx quinquepartitus, persistens. Corolla nulla. Staminodia subpetaloidea 5, hyalina, sepalis opposita. Stamina fertilia 10, imo calyci inserta, quinque sepalis opposita cum basi staminodiorum accreta, quinque alterna breviora. Styli filiformi 3, rarius 4–5–7. Ovarium uniloculare; ovulis plurimis columellæ centrali affixis. Capsula trivalvis, raro 4–5–7-valvis. Semina plurima, estrophiolata. Embryo annularis, albumen farinaceum cingens.— Suffrutices vel herbæ perennes, Sandwicenses, oppositifolii, exstipulati; cymulis thyrsoideo-congestis vel effusè paniculatis, raròcyma pauciflora.

CONSPECTUS GENERIS.

§ Euschiedea. Filamenta capillaria. Styli 3, rarius 4–5, intus stigmatosi.—Flores parvi, thyrsoideo-congesti vel effusè paniculati.

* Panicula deliquescens, effusa: sepala acuminata: folia uninervia.

+ Staminodia apice bifida: filamenta longè exserta.

1. S. Nuttallii *Hook.*
2. S. diffusa *Gray.*

+ + Staminodia lanceolata, acuminata: filamenta calyce breviora.

3. S. amplexicaulis *sp. nov.*
4 S. stellarioides *sp. nov.*

* * Panicula contracta, ramosa, deliquescens: folia trinervia.

5. S. MENZIESII *Hook.*
6. S. HOOKERI *Gray.*

* * * Panicula thyrsoidea, contracta, interrupta: folia uninervia.

+ Staminodia apice bifida: filamenta longè exserta.

7. S. LIGUSTRINA *Cham. et Schlect.*
8. S. SPERGULINA *Gray.*

+ + Staminodia apice bifida: filamenta calyce breviora.

9. S. REMYI *sp. nov.*

* * * * Thyrsus globosus, nunc tripartitus: folia tripli–quintupli-nervia: staminodia integra obtusa: filamenta brevissima.

10. S. GLOBOSA *sp. nov.*

§ NOTHOSCHIEDEA. Filamenta complanata subulata. Styli 7, undique stigmatosi. Staminodia integra, obtusa, brevissima: filamenta calyce breviora.—Flores pro genere maximi, perpauci, sepalis subpetaloideis.

11. S. VISCOSA *sp. nov.*

Schiedea amplexicaulis *sp. nov.*

Suffruticosa: foliis oblongo-linearibus obtusis mucronatis uninerviis basi lata auriculata amplexicaulibus; panicula ramosissima patentissima; pedicellis minutissimè hirsutis; sepalis ovato-lanceolatis acuminatis scarioso-fibrilloso-marginatis hispidulis enerviis capsula 3-valvi paullo longioribus; staminodeis lanceolatis apice attenuato integerrimis; filamentis brevibus; seminibus lævibus.—"Kauai or Niihau," Hawaiian Islands. (Remy, 548 bis.)

Schiedea stellarioides *sp. nov.*

Caule basi suffruticoso ramosissimo; foliis spathulato-linearibus obtusis mucronatis emarginatisve uninerviis, junioribus basi attenuata hirsuto-ciliatis; paniculâ effusâ gracili; pedicellis primum pubescentibus; sepalis attenuato-lanceolatis enerviis capsulâ 3-valvi paullo longioribus; staminodiis lanceolatis apice attenuato integerrimis; filamentis brevibus; seminibus rugulosis.—On the mountains above Waimea, Kauai, one of the Hawaiian Islands. (Mann & Brigham, 595.)

Schiedea Remyi *sp. nov.*

Suffruticosa; foliis inferioribus angustato-linearibus uninerviis fasciculatis, superioribus subulatis; paniculâ thyrsoideâ contractâ e cymulis brevibus puberulis compositis; sepalis ovatis obtusis plurinerviis capsulam superantibus; staminodiis apice bifidis; filamentis brevibus; seminibus ferè lævibus.—Molokai, one of the Hawaiian Islands. (Remy, 551.)

Schiedea globosa *sp. nov.*

Humilis; caulibus e caudice herbaceo erectis simplicissimis; foliis inferioribus obovato-lanceolatis sessilibus 3–5-plinerviis, superioribus angustioribus parvis tripli-nerviis; cymulis plurifloribus in capitulum terminale globosum raro trifidum longius pedunculatum arctè congestis; sepalis ovatis obtusis infra medium nervatis capsulâ ovato-lanceolatâ 4-valvi brevioribus; staminodiis integerrimis obtusis staminibusque calyce 2–3-plo brevioribus; seminibus paucis rugulosis. —Oahu. (Mann & Brigham, 580; Remy, 552.)

Schiedea viscosa *sp. nov.*

Decumbens, suffruticosa, glanduloso-pubescens; ramis adsurgentibus foliosis apice laxè 2–6-floribus; foliis breviter oblongis utrinque acutissimis petiolatis trinervatis demum glabratis; sepalis ovatis acuminatis plurinerviis capsulam 7-valvem superantibus; filamentis calyce brevioribus staminodiâ latè ovatâ obtusa 3-plo superantibus, iis staminodiorum oppositis latioribus; seminibus plurimis tuberculato-rugulosis.—At three thousand feet elevation, on the mountains of Waimea, Kauai. This species differs so entirely in its aspect from the rest of the genus, in its almost trailing manner of growth, and in its peculiarly nerved leaves and large flowers nearly half an inch long, forming a comparatively simple cyme, as to form quite a distinct section. (Mann & Brigham, 579.)

ALSINIDENDRON *Nov. Gen. Caryophyll.*

Calyx quinquepartitus, sepalis decussatim imbricatis ovalibus subcarnosis albidis etiam in anthesi conniventibus, raro cum quinto minimo interno. Petala et staminodia nulla. Stamina 10, margini disci tenuissimæ basi calycis accreti inserta: filamenta filiformia: antheræ lineari-oblongæ, utrinque emarginatæ. Ovarium uniloculare; ovulis plurimis columellæ centrali affixis: styli 4–7, breviter filiformes, apice intus stigmatosi. Capsula utriculata?, polysperma. —Frutex Sandwicensis, orgyalis, ferè glaber; ramis foliosis; foliis oppositis amplis ovatis ovalibusque cuspidato-acuminatis basi in petiolum subito angustatis eximiè trinervatis subeveniis; cymis plurifloribus pedunculatis ex axillis superioribus, floribus subglobosis in pedicellis filiformibus pendulis.

Alsinidendron trinerve *sp. nov.*

Growing on the Kaala Mountains, Oahu, at an elevation of about two thousand feet.—A glabrous branching shrub, about six feet high. Leaves three or four inches long, and one and a half to two inches wide, of a somewhat chartaceous texture, oval or ovate, cuspidate-acuminate, tapering abruptly at the base into a margined petiole about an inch long, and with three strong ribs running from the base to the very apex. Cymes from the axils of the upper leaves, on peduncles an inch or more long. Flowers pendulous from the ends of long (3–8 lines) capillary pedicels, somewhat globose in shape, a little truncated at the base, and of a light or whitish color. Sepals four (rarely with a minute internal fifth), about four lines long, a little fleshy at the base, but with thinner margins and apex, closely imbricated, the two outer completely enclosing the two inner in the bud. Petals and staminodia none. Stamens ten, shorter than the calyx; the filaments arising from the margin of a thin perigynous disk, and about as long as the oblong-linear emarginate anthers, which are erect and affixed by a deeply notched base. Ovary ovoid: styles short, 4–7. Capsule membranaceous (only the immature seen) and probably not opening by valves. Seeds numerous, borne on a central placenta. (Mann & Brigham, 582. Also Hillebrand, fide Oliver in litt.)

Revision of the Rutaceæ of the Hawaiian Islands.

By H. Mann.

Pelea *Gray.*

**Foliis verticillatis; floribus in axillis fasciculatis brevissimè pedicellatis.*

Pelea clusiæfolia Gray, Bot. S. Pacif. Ex. Exp. 1, p. 340, t. 35.

Glaberrima; foliis ter–quaternatim verticillatis vel oppositis cuneato-oblongis obovatisve crasso-coriaceis petiolatis; calycis lobis ovatis membranaceis petalis plus dimidio brevioribus; stylo ovario glabro longiore; capsula obtusè quadriloba.—*Clusia sessilis* Hook. & Arn. Bot. Beech. Voy. p. 80, non Forst.

Oahu, on the mountains behind Honolulu, and on the Kaala Mountains. Hawaii, on the Windward slopes of Mauna Kea, and in the district of Puna. (Expl. Exp.; Mann & Brigham, 599.)

Pelea sapotæfolia *sp. nov.*

Foliis (amplis chartaceis) quaternatim verticillatis elongato-oblongis emarginatis basi subattenuatis supra glaberrimis subtus præsertim ad costam pubescentibus, crebrè penninerviis chartaceis longiusculè petiolatis; calycis lobis latè ovatis petalis ovatis brevioribus; stylo *quadripartito* ovario longiore; capsula . . . .

Kauai, in the valleys of Kealia and Hanalai, on the windward side of the island. (Mann & Brigham, 559.)

A small tree, about twenty feet high, much branched. The young naked leaf-buds hirsute, as in all the species; the branches and inflorescence glabrous. Leaves verticillate in fours, elongated-oblong or slightly spathulate-oblong, chartaceous, four to nine inches long, by two to three wide, somewhat attenuated at the base, or sometimes obtuse, petioled (the petioles one to one and a half inches long), with a strong midrib prominent underneath, the very numerous primary veins (thirty to fifty pairs) running out nearly transversely towards the margin, where they unite with a distinct intramarginal vein; the leaves are somewhat villous pubescent on the under surface, more especially on the midrib, but quite glabrous above. The texture, and especially the venation of the leaves, gives them somewhat the appearance of the larger forms of *Sapota Sandwicensis*. Flowers in axillary sessile clusters, the pedicels two to three lines long. Calyx four-parted; the lobes broadly ovate, imbricated in æstivation, about one and a half lines long. Petals four, valvate in æstivation, ovate, a third longer than the sepals, not much thickened at the apex. Stamens eight, much shorter than the petals: filaments linear-lanceolate, glabrous: anthers deltoid-sagittate, adnate-introrse. Hypogynous disk very short. Ovary glabrous, depressed-globular, four-lobed, four-celled, the four carpels somewhat united. Style a little longer than the ovary, *four-parted nearly to the base;* the divisions clavate, stigmatic at and near the summit. The immature capsule is puberulent and deeply four-grooved.

Pelea auriculæfolia Gray, l. c. p. 343, t. 36.

Glabra; foliis (amplis subcoriaceis) ternatim verticillatis oblongo-spathulatis basi auriculatis sessilibus, junioribus subtus pubescentibus; floribus fasciculatis ad axillas foliorum delapsorum secus caulem virgatum; capsula quadripartita.

Hawaii, on Mauna Kea, (Expl. Exp.); and on the Kohala Ridge, (Hillebrand.)

* * *Foliis oppositis* (P. anisata *excepta crasso-coriaceis eximiè reticulatis*) *: pedunculis cymoso-uni–plurifloris.*

Pelea Kavaiensis *sp. nov.*

Foliis ovalibus supra glaberrimis subtus præsertim ad costam velutino-villosis petiolatis; floribus in axillis solitariis pedicellatis parvis;

calycis lobis ovato-rotundatis petalis ovatis dimidio brevioribus; stylo ovario glabro æquilongo; capsula parva quadripartita glaberrima.

Kauai, on the mountains above Waimea, at the elevation of three thousand feet. (H. Mann.)

A small tree, fifteen feet high, with the branches and inflorescence glabrous. Leaves opposite, from two and a half to four inches long, and one and a half to two and a half inches wide, entire, coriaceous, glabrous and very conspicuously and finely reticulate-veiny above (the veins uniting into an irregular intramarginal vein), beneath clothed with a dense velvety villosity, which is especially thick on the midrib; petioles one half to one inch long. The small flowers are solitary in the axils of the leaves, borne on slender pedicels about two lines long. Calyx four-lobed; the lobes rounded-ovate, about three-fourths of a line in length. Petals thin and valvate in æstivation with the apices incurved, ovate, obtuse, about one and one fourth lines long. Stamens eight, short; filaments slender; anthers sagittate. Style about the length of the glabrous ovary, terminated by an obtusely four-lobed stigma. Capsule four-parted, one or more of the ovate glabrous cocci often abortive. Ripe fruit unknown.

Pelea anisata *sp. nov.*

Glabra; foliis chartaceis oblongis obtusis petiolatis; floribus in axillis solitariis raro binis vel ternis brevissimè pedicellatis; calycis lobis latè ovatis obtusis petalis ovato-oblongis triplo brevioribus; stylo ovarium bis superante; capsula leviter quadriloba.

Kauai, on various parts of the island, but most abundant in the neighborhood of Hanalai. (Mann & Brigham, 557.)

A large shrub or small tree, the "Makihana" of the natives, fifteen to twenty feet high, or perhaps more (the stem sometimes being four inches in diameter); in general appearance resembling *P. oblongifolia*, but perfectly distinguished by its overpowering anisate odor when the leaves are bruised or the bark peeled off: the other species have only a heavy rutaceous odor. Leaves elongated-oval or oblong, obtuse, somewhat attenuated at the base, two to seven inches long, one to two inches wide, of a chartaceous texture, loosely reticulate-veined, borne on petioles one half to one inch long. The flowers are usually solitary in the axils of the leaves, but sometimes two or three together; pedicels one or two lines long. Calyx four-parted; the lobes ovate, obtuse, rather thick, less than a line long. Petals four, oblong or oblong-ovate, thrice the length of the sepals, valvate in æstivation. Stamens eight, very short, not exceeding the calyx-lobes in length; filaments broadly linear-lanceolate; anthers short-sagittate. Ovary glabrous, depressed-globular and very slightly lobed, terminated by a style nearly twice its length, which is very slender and bears a spreading crown of four ovoid stigmas. The mature capsule is but slightly four-lobed, about half an inch in diameter, and splitting by loculicidal dehiscence to the centre into four triangular segments joined at the base. The exocarp is thick and woody, the endocarp papery and quite smooth within.

Pelea oblongifolia Gray, l. c. p. 343.

Glabra; foliis oblongis seu ovalibus petiolatis; pedunculis florum fertilium uni–paucifloris petiolum adæquantibus, florum sterilium laxè paucifloris petiolo longioribus; calycis lobis ovatis petalis ovato-lanceolatis triplo brevioribus; stylo ovario bis longiore; capsula p. m. quadriloba, coccis subcarinatis.

Oahu, in various parts on the mountains. Kauai. Hawaii. (Expl. Exp.; Mann & Brigham, 208, 235, 376, 600.)

Pelea rotundifolia Gray, l. c. p. 344, t. 37.

Glabra; foliis orbiculatis basi subcordata sessilibus; floribus cymosis; calycis lobis ovatis petalis plus dimidio brevioribus; stylo ovario puberulo bis longiore; capsula (pollicari) profunde quadriloba, coccis ovalibus haud carinatis, endocarpio intus minutè puberulo.

Oahu, on the mountains behind Honolulu. (Expl. Exp.; Mann & Brigham, 209).

Pelea Sandwicensis Gray, l. c. p. 345, t. 37

Brunellia Sandwicensis Gaud. Bot. Freyc. Voy. p. 93, sine descr.; Hook. & Arn. Bot. Beech. Voy. p. 80.

Ramis novellis cum inflorescentiâ cymoso-3–9-florâ hirsutulo-tomentosis; foliis ovalibus oblongisve petiolatis supra glaberrimis subtus præsertim reticulatis; calycis lobis ovato-rotundis petalis plus dimidio brevioribus; stylo floram fertilium ovario longiore; capsula quadripartita tomentulosa, coccis ovalibus haud carinatis, endocarpio intus puberulo.

Oahu, on the mountains behind Honolulu. West Maui, on the mountains. (Expl. Exp.; Remy, 622.)

Pelea volcanica Gray, l. c. p. 346, t. 38.

Ramis junioribus petiolis et inflorescentiâ cymuloso-paniculatâ hirsuto-tomentosis; foliis ovalibus petiolatis supra glaberrimis subtus parcè hirsutis; calycis lobis ovatis acutis hirsutis petalis hirsutulis dimidio brevioribus; stylo gracili ovario tomentoso æquilongo; capsula (sesquipollicari) glabra quadriloba, coccis recurvis carinatis.

Hawaii, in forests on Mouna Kea, (Expl. Exp). Oahu, on the Kaala Mountains, (H. Mann.)

Melicope *Forst.*

Relying upon the valvate æstivation of the corolla, I have still kept the genus *Pelea* distinct from *Melicope*, notwithstanding Bentham and Hooker, in the *Genera Plantarum*, have united them. They say of *Melicope* proper "petala imbricata vel valvata"; but all those from the Hawaiian Islands most certainly have an imbricative æstivation, as also has the original *M. ternata* of New Zealand. Their section *Astorganthus* is said to have "petala valvata," but in all the specimens which I have examined of its only known species, *M. simplex*, the æstivation is certainly imbricative. If, therefore, this character is sufficient, these genera should be retained. If not, the best arrangement might be to throw the Melicopes of the Hawaiian Islands, which all have simple leaves, into *Pelea*, and retain the genus *Melicope* Forst., for the unifoliolate species *M. simplex* and the trifoliolate species of New Zealand and Australia.

Melicope cinerea Gray, l. c. p. 350, t. 39.

Foliis oblongis obtusis basi rotundatis petiolatis pallidis utrinque subtus præsertim ramulisque junioribus puberulo-tomentellis; pedunculis petiolum subæquantibus; floribus cymosis extus canescentibus; calycis lobis ovatis acutis sericeis petalis sericeis brevioribus; capsula quadripartita, coccis ovoideis glabratis.

Oahu, on the Kaala Mountains, (Expl. Exp.; Mann & Brigham, 558.)

Melicope barbigera Gray, l. c. p. 351, t. 39.

Foliis ovato-oblongis utrinque obtusis petiolatis, adultis viridibus supra glabris subtus secus costam villoso-barbatis; pedunculis uni–trifloris petiolo brevioribus; floribus canescentibus; calycis lobis ovato-lanceolatis acuminatis, puberulis petalis ovato-lanceolatis puberulis paullo brevioribus; capsula quadrisecta, folliculis lenticulari-ovoideis glabratis.

Kauai, on the mountains above Waimea. (Expl. Exp.; Mann & Brigham, 560.)

Melicope spathulata Gray, l. c. p. 352.

"Glabra; foliis elongatis spathulato-oblongis seu oblanceolatis obtusis basi acutis; pedunculis axillaribus bi–trifloris; sepalis petalisque glabris orbiculatis."

"Kauai, on the mountains." (Expl. Exp.)

Melicope elliptica Gray, l. c. p. 353.

Glabra; foliis ellipticis utrinque obtusis petiolatis reticulatis; pedunculis petiolo longioribus; floribus pedicellisque canescentibus; calycis lobis ovoideis acutis petalis ovatis dimidio brevioribus; capsula quadripartita; coccis ovoideis apiculatis tomentulosis.

Oahu, Kaala Mountains, (Expl. Exp.) Maui, forests on the slopes of Haleakala. (Mann & Brigham, 377.)

PLATYDESMA *Nov. Gen. Medicosmæ affinis.*

Flores hermaphroditi. Calyx quadrisepalus, persistens, imbricatus; sepalis rotundatis, exterioribus majoribus interiora æstivatione includentibus. Petala 4, æstivatione latè convoluto-imbricata vel convoluta, ampla, obovata, apice recurva. Discus planus, leviter 4-lobus. Stamina 8, disco inserta, infra medium monadelpha; filamentis nudis ovatis seu ovato-lanceolatis crassis; antheræ sagittatæ, facei interiori infra apicem filamenti adnatæ. Ovarium 4-partitum: stylus centralis: stigmate 4-lobo: ovula in loculis 5, amphitropa. Cocci erecti, omnino discreti, subsucculenti, abortu sæpissimè dispermæ, endocarpio tenui cartilagineo. Embryo . . . . . —Arbuscula Sandwicensis, ferè glabra, graveolens. Folia opposita, ampla, simplicia, lanceolata vel obovato-lanceolata, obtusa vel acuminata, petiolata. Cymæ axillares paucifloræ, pedicellis 2–bracteolatis. Flores magni, albi.

Platydesma campanulata *sp. nov.*

Oahu, on the mountains behind Honolulu, at middle heights. (Mann & Brigham, 94.)

A tree twenty-five or thirty feet in height, with a spreading crown, and a trunk eight or ten inches in diameter, nearly glabrous; the younger branches and leafy shoots of a light color, or when quite young greenish, striped with narrow ridges and depressions: exhaling a strong terebinthine odor when cut or bruised. Leaves varying in size on different parts of the tree, from three to fourteen inches long, by one to four or five wide, lanceolate, or more usually obovate-lanceolate, obtuse or acuminate, dark green above, and lighter beneath, tapering at the base, of a not very thick coriaceous texture, pinnately veined (six to eighteen pairs of veins); the veins divaricating after reaching about three-fourths of the distance to the margin, not uniting to form a distinct intra-marginal vein, and not strongly reticulated; the leaves very copiously punctate with innumerable small raised glandular dots appearing black by reflected light; the petioles one half to two inches long. Peduncles about equalling the petioles in length, bearing ovate-subulate bracts. Cyme three to five-flowered. Pedicels bracted, two or three lines long. Flowers hermaphrodite, nine to ten lines long by six to seven lines in diameter, campanulate. Sepals four, four or five lines long, decussatingly imbricated, the two outer longer and much thicker ones enclosing the two inner in the bud, clothed with a minute sericeous pubescence extending down on to the pedicels. Petals four, alternate with the sepals, in æstivation strongly imbricated or often truly convolute, inserted under the disk, eight to nine lines long, obovate, thick and fleshy, white, minutely sericeous, bearded on the margins, with the somewhat spreading and recurved tips apiculate. Stamens eight, nearly as long as the petals, inserted on the margin of the thin hypogynous disk; the much dilated filaments monadelphous to the middle; the sagittate introrsely dehiscent anthers wholly adnate to their interior face, and about two lines long. Ovary globular, the four rounded-triangular carpels joined only by the central columnar style, which is four times their length. Stigma terminal, entire, slightly four-grooved. Ovules five in each cell, collateral and superposed, hemitropous. Fruit consisting of four coriaceous, erect, distinct cocci eight to nine lines long, and three or four in diameter, lined with a hard, smooth, crustaceous endocarp, and half enclosed by the persistent cup-shaped calyx; usually ripening two seeds which very much resemble those of *Pelea*. Embryo not seen.

ZANTHOXYLUM *Colden.*

Zanthoxylum Kavaiense Gray, l. c. p. 354.

"Inerme, glabrum; foliis alternis pinnatis 3–5-foliolatis; foliolis coriaceis ovalibus integerrimis haud punctatis; paniculis axillaribus compositis; fructibus stipitatis;"—floribus tetrameris; calycis lobis ovato-subulatis petalis fl. masc. lanceolatis triplo, fl. fœm. lineari-ligulatis quadruplo brevioribus; antheris ovalibus; ovario solitario.

Kauai, (Expl. Exp.) Hawaii, (Remy, 614.)

The fruit has been described from the specimens of the South Pacific Exploring Expedition. I have described the flowers from a specimen, probably of the same species, collected on Hawaii by Remy, but differing in the thinner texture of the leaves, which appear with the flowers. Calyx four-lobed; the lobes ovate-subulate, about three-fourths of a line long, in the male flowers thrice shorter than the lanceolate petals; stamens four, a line in length; filaments capillary;

anthers oval. In the female flower the sepals are four times shorter than the linear-ligulate petals, which are imbricated in æstivation; stamens reduced to four glands; ovary unilocular, stipitate; stigma globular.

Zanthoxylum Maviense *sp. nov.*

Inerme, pube tenuiter velutina cinereum; foliis alternis 3-foliolatis; foliolis coriaceis ovalibus (lateralibus basi hinc excisa valde inæquilateris) integerrimis haud punctatis; paniculis axillaribus; coccis solitariis estipitatis lunulato-ovoideis.

Maui, (Remy, 615.)

The specimen is apparently from an unarmed tree, bearing mature fruit only, it is cinereous with a fine velutinous pubescence, especially on the under surface of the alternate trifoliolate leaves. Petioles fifteen to twenty lines long. Leaflets ovate, truncated at the base; the two lateral ones unequal, the upper base being three lines shorter than the lower, two to two and a half inches long by fifteen to twenty lines wide. Panicle several-flowered. Carpel solitary estipitate, four to five lines long, lunulate-ovoid, becoming two-valved; the endocarp adnate. Seed solitary, filling the cell.

Zanthoxylum (Blackburnia) dipetalum *sp. nov.*

Inerme, glabrum; foliis alternis 3–9-foliolatis; foliolis coriaceis oblongis vel ovatis integerrimis punctatis; paniculis florum sterilium compositis; petalis 2 ovalibus crassissimis æstivatione valvatis calyce 4-dentato quadruplo-longiore; antheris oblongis: — flores fertiles fructusque ignoti.

Oahu, on the mountains behind Honolulu, (H. Mann and Dr. Wm. Hillebrand.)

A tree about thirty feet high, entirely glabrous. Dr. Hillebrand's specimens furnish immature sterile flowers. Leaves alternate, 3–9-foliolate, petioled. Leaflets two to four inches long by seven to twenty lines wide, oblong or oblong-ovate, obtuse, coriaceous, punctate, pinnately veined, entire, equal at the base, and Dr. Hillebrand's specimen with one or two small (three to nine lines long) foliar bodies arising from just below the lower leaflets, which, were it not for their anomalous position, might be likened to large stipules. Panicles axillary or terminal, cymosely many-flowered, with a very thick and nodose peduncle and axis. Calyx small, less than a line long, four-lobed. Petals only two, oval, valvate in æstivation and remarkably thick, in the bud three or four lines long, probably caducous. Stamens four; filaments short, subulate; anthers oblong.

Chemical Analyses of Minerals associated with the Emery of Chester, Mass. By. C. T. Jackson, M. D.

Andesine.

This mineral, formerly mistaken for granular Quartzite and Indianite, constitutes two veins of from one foot to eighteen inches in width, occurring on each side of the great Emery vein in the South Mountain. Where exposed to atmospheric influences. this mineral is white and loosely granular like granular quartz, readily crumbling like sand where it has long been acted upon by frost. In the river, below water, it is of a greenish tint, and has the close granular fracture of wax, little resembling the weathered mineral.

Hardness 7.5, or between Quartz and Topaz.

Specific Gravity 2.586.

COMPOSITION.

	NO. I.		NO. II.
Silica	60.00		62.00
Alumina	25.00		24.40
Lime	3.50		3.50
Magnesia	0.70		0.70
Soda	8.07		8.07
Water	1.00		1.00
		Trace of ox. Iron	
	98.27		99.67

Analysis No. 1. was repeated only on the Silica and Alumina.

Diaspore.

This mineral is found in the form of broad bladed and longitudinally striated crystals, on the Emery of the South Mountain in Chester. It also exists in druses of delicate elongated quadrangular prisms in cavities, and in short, broad prismatic crystals, implanted in the solid Emery, and presenting blue and violet tints, according to the position of their planes.

It is rather difficult to detach perfect specimens when the mineral occurs attached directly to the solid Emery, but when separated by the chloritoid, the masses containing good crystals can be broken off without difficulty. From the name of the mineral, it will be understood that it cracks or breaks readily, the Greek term signifying cracked. Two analyses were made of the Chester Diaspore. No. 1 by my son, John C. Jackson, and No. 2 by myself.

Hardness 7 1-4, or a little harder than Quartz crystal.

Specific gravity 3.39.

COMPOSITION.

	No. I.	No. II.
Alumina	80.75	83.00
Water	14.75	14.80
Ox. of Titanium and Ox. of Iron.	4.50	3.00
	100.00	100.80

Alumina determined by difference in No. 1.

Margarite.

Analysed by John C. Jackson in my Laboratory.
Hardness 3.5 to 4. Specific Gravity 3.03.

COMPOSITION.

Silica	29.84
Alumina	53.84
Lime	10.38
Magnesia	0.24
Soda and Potash	2.46
Peroxide of Iron	0.30
Water	1.32
	98.38

Prof. J. Lawrence Smith says he has detected Lithia among the Alkalies of this mineral, which would seem to give it a place between the Micas and Lepidolite, the latter containing Lithia as its chief alkali.

Margarite is extremely abundant in the Chester Emery mine, and the specimens are the most beautiful that have thus far been discovered in any part of the world.

Clinochlore or Chloritoid of the Chester Emery Mine.

The specimens analysed contained microscopic grains of magnetic iron ore which could not be wholly separated mechanically, hence the proportion of oxide of iron in the analysis is too great for pure Chloritoid. This mineral is distinct from Chlorite on account of a deficiency of the essential proportions of Magnesia in that mineral.

	Clinochlore of Chester.	Bonsdorff's Chloritoid.	Masonite (Nobis).
Silica	22.50	27.48	33.20
Alumina	23.50	35.57	29.00
Per. ox. Iron	41.50	27.05	25.93
Magnesia	1.80	4.29	0.24
Water	11.00	6.95	4.00
		$Mn. O^2=0.30$	6.60
	100.30	101.64	98.97

Chlorite consists, according to the analysis by Varrentrapp, of—

Silica	30.38
Alumina	16.97
Magnesia	33.97
Protox. Iron	4.37
Water	12.63
	98.32

There are several varieties of Chlorite; specimens from Switzerland and Dauphiny differing considerably from the above from Siberia, but not one of them contains less than 14 per cent. of Magnesia.

Capt. N. E. Atwood spoke on the habits and distribution of the Haddock.

Its distribution is not so wide as that of the Cod, as it is not common south of Nantucket Shoals, nor north of the Gulf of St. Lawrence, where it is not very abundant, but the specimens taken are very large. They have been found recently in abundance on the southern border of the Grand Banks.

Fifty years ago this fish was scarce on the Grand Bank, and along our coast few were caught. In 1840, they became very numerous about Cape Cod, so as to interfere seriously with the cod fishery, as they would take the cod bait. In about 1850, they had increased so rapidly that the markets were glutted, as they have been at times since. They have been caught in great numbers this spring, and seem to be still on the increase. It is possible that the method of fishing by trawls may increase their numbers by catching up other species of fish that prey upon their spawn.

It spawns in the spring months when it is taken in shore, in shallow water. Out of the spawning season they are caught farther out in deeper water. In the winter they do not leave the coast, but keep about the outer fishing grounds. While the cod is taken usually with hand lines, the haddock is almost exclusively taken by trawls. The hooks are lowered to the bottom and the haddock will take the bait freely, while the cod will only take the bait when it is raised a short distance from the bottom. Salted menhaden is used frequently for haddock, which they will take freely, while it is poor bait for cod; both cod and haddock will readily take stale clams, as they are much better for bait than when fresh.

The cod prefers fresh or live fish for bait, and seizes the Lance and Pipe-fish. Capt. Atwood exhibited specimens of the Lance-fish which had been taken from the bodies of the cod, when the fish was cleaned; the Lance was changed into a solid mass, encysted in the flesh near the back bone, was hard and gritty, and difficult to cut with the knife. The fish had evidently been swallowed by the cod; and had remained as a foreign body for a long time, becoming hardened by the deposition of salts. Its presence did not seem to affect the health of the cod.

April 18, 1866.

The President in the chair.

Thirty-eight members present.

The following papers were read:

On the Polyps and Corals of Panama with Descriptions of New Species. By A. E. Verrill.

In the following pages I have attempted to bring together all the species of Polypi, hitherto observed on the west coast of Central America, so far as they are known to me, together with several that appear to be new to science, sent home by Mr. F. H. Bradley, who has spent three months in collecting the Marine Invertebrates of that region for the Museum of Yale College. This collection also affords the means of gaining a better knowledge of several species which I described in the Bulletin of the Museum of Comparative Zoölogy, No. III., page 29, 1864, from specimens belonging to that Museum and to the Smithsonian Institution, but in some cases not so numerous or characteristic as was desirable.

The differences in the character of the Polyp Faunæ of the Atlantic and Pacific sides of Central America, are very remarkable. At Aspinwall coral reefs occur, having essentially the same features as those of Florida and the West Indies, formed by the same species of corals, and inhabited by the same species of Echinoderms, Mollusca, Crustacea, etc. Nearly all the well known reef-building corals of Florida are found at Aspinwall, viz.: *Porites astræoides* Lmk., *P. clavaria* Lmk., *Madrepora palmata* L., *M. cervicornis* L., *M. prolifera* L., *Mæandrina clivosa* Verrill, *M. labyrinthica*, M. *sinuosa* Les., and other species, *Manicina areolata* Ehr. *Siderina radiata* Verrill, *S. galaxea* Blainv., *Orbicella cavernosa* Verrill, *O. annularis* Dana, etc. But at Panama none of these forms occur, nor even any of the genera of the families to which they belong, with the exception of *Porites*, which is there represented by a small species, and by another allied genus, *Stephanocora*, attaining no great size. The *Millepora alcicornis* L., so abundant on the Atlantic side, even at Aspinwall, is not represented at Panama, or on the Pacific coast, by any species belonging to the same family, but *Pocillopora*, an almost exclusively Pacific and Indian Ocean genus, is the most nearly allied form found at Panama; if indeed, the latter proves to be an Acalephian coral, as Prof. Agassiz supposes.

Consequently at Panama, and on the entire western coast of Central America within the tropics, no true coral reefs occur. The few small species of calcareous corals merely encrust the rocky reefs in some places, and cluster in their crevices and pools, and whenever calcareous deposits occur about the reefs, they are composed chiefly of broken shells with mud and sand. The *Gorgonidæ*, also, are entirely different on the two sides. The most prominent West Indian genera, *Pterogorgia*, *Xiphigorgia*, *Plexaura*, *Plexaurella* and *Eunicea*, each represented by several species at Aspinwall, Florida, etc., do not, so far as yet known, occur at all on the Pacific coast of Central America.* The *Gorgonia flabellum* of the West Indies, is represented by three allied species at Panama, but of small size. The typical *Gorgoniæ* are about equally represented on each coast, but the forms are very distinct. The genus *Muricea* is most fully represented at Panama, no less than six species occuring there, while in the West Indies there are but four well established species. The forms of this genus occuring at Panama, are mostly thickly branched and rigid; while those of the West Indies usually have long, slender, and more flexible branches.

Of true corals the genus *Astrangia* is peculiarly characteristic of the Panama region, from whence we have five species, besides two others belonging to closely allied genera. In the West Indies two species occur, *A. solitaria* Verrill (? *A. neglecta* Duch.) and *A. granulata* Duch. On the coast of South Carolina and Georgia, *A. astræiformis* E. & H., and on the coast of Long Island Sound *A. Danæ* Ag., represent this genus. Another species allied to *A. Edwardsii*† Verrill, and perhaps identical, occurs at Terra del Fuego. The remaining described species, *A. Michelini* E. & H., is of unknown origin. The single previously described species of *Ulangia* (*U. Stokesiana* E. & H.) is from the Philippines; and the only other known *Phyllangia*, which is living (*P. Americana* E. & H.) inhabits the West Indies.

These remarkable differences between the two faunæ do not favor the theory that has been entertained by some geologists, that there has been a communication between the two oceans at this point, and that

* A species of *Plexaura* (*P. fucosa*) occurs, however, on the coast of California near San Francisco.

† This name I propose for the species called *Astrangia Danæ* by Edwards and Haime, not *A. Danæ* Agassiz, of previous date.

the Gulf Stream flowed across the isthmus into the Pacific, within comparatively recent geological times. Indeed the Palæontology of the eastern coast of the United States, in connection with that of California and Western America, so far as it is known, would rather show, as do the living faunæ, that there has been no connection, or at least none sufficient to materially change the course of the Gulf Stream, since the commencement of the Tertiary Period. The fossils of the Eocene and Miocene deposits of the Southern States are, to a great extent, similar in their distribution to the living forms that have taken their places, and in numerous instances are more nearly allied to the corresponding living faunæ than the faunæ of the two sides of the Isthmus are to one another.

Even in the Glacial, or Drift Period, the arrangement of the different marine faunæ along our coast was essentially the same as at present. The Arctic faunæ having descended only a few hundred miles farther south, to the coast of New England, while south of Cape Cod, the greater part of the fossils of that period are now living in adjacent waters. There are also facts that go to show that at that time the Carolina coast was even warmer than at present. One of the principal changes that appears to have taken place since the Tertiary Period, has perhaps been caused by the permanency and continued uniform action of the Gulf Stream itself: namely,—the fauna of the coast of Texas, and the other States bordering on the Gulf of Mexico, which is so similar to that of Georgia and the Carolinas that we may suppose that at one time they were directly connected, and have become gradually separated by the southern extension of the Peninsula of Florida, in consequence of the gradual introduction of West Indian species of corals, which have formed reefs, and thus continually increased the separation of the two more temperate regions by an extending cape, essentially West Indian in its faunal characters.

This long continued growth of the reefs has required an equally prolonged and uniform flow of the Gulf Stream, the direction of which has, perhaps, been somewhat altered in consequence of the extension of the reefs. The existence of the extensive coral reefs of Bermuda is also wholly dependent upon the prolonged and uniform flow of the Gulf Stream with nearly its present direction and force, for those reefs are nearly identical with those of the West Indies and Florida in structure, and in the species of corals that form them, and are so far north that they could not have begun to exist until the present course of the Gulf Stream had been established, and the floating coral germs had been carried there from the West Indies or Florida.

Therefore, had the Gulf Stream ever flowed across the Isthmus since the commencement of the Tertiary Period, we ought to find, if not living corals identical with those of the West Indies, at least elevated remains of former reefs of similar kinds, no traces of which are yet known.

Renilla amethystina Verrill, l. c., p. 29.

This large and fine species was found so abundantly on mud flats at low water, by Mr. Bradley, that in three days he obtained one hundred and fifty specimens. Some of them were six inches across while living. It was usually deep purple, but occasionally light purple or white. According to Mr. Bradley's observations upon the living polyps, these are mostly .25 of an inch long, and about .12 across the expanded tentacles, the bodies of the polyps being about .06. They are transparent with an opaque stomach, the eight radiating lamellæ showing through the walls; around the small mouth, which is edged with white, are eight radiating white points, corresponding to the intervals between the tentacles; around the base of the tentacles is a brown ring, which runs down in points opposite the spaces between them. Opposite the base of each polyp are two (rarely four or five) bunches of little white rays. The frond is nearly transparent, but highly colored by very numerous purple spicula, evenly distributed on the peduncle and lower surface, but on the upper side arranged along the edges of the polypiferous radiating lines, and especially concentrated about the five (rarely six or seven) white points that surround the closed polyps. The polyps are arranged somewhat in quincunx, in lines that radiate from the attachment of the peduncle, and curve outward on the sides to the lobes. The tentacles are narrow and tapering, .04 to .06 long, bearing, especially in young specimens, well marked pinnæ at the tip and edges, which in old ones often become reduced to a mere fringe.

On mud flats, edge of sand beach, east of R. R. wharf, Panama. F. H. Bradley.

Gorgonia ramulus Val.

This species occurs of both uniform white and reddish purple colors, sometimes also pink, and in one specimen there are both white and bright purple branches on the same stalk. It is densely ramulous with prominent, often bilobed, small verrucæ. Some specimens are eight inches high, and as much in diameter.

Panama, very common. F. H. Bradley. Occurs also at Acapulco, Mexico, and Cape St. Lucas, Cal.

Gorgonia aurantiaca Verrill, l. c., p, 33.

Lophogorgia aurantiaca Horn. Proc. Phil. Acad.

This species is much more elegant than the last, forming finely branched flabelliform tufts, with slender divaricate branchlets, obtuse at the ends. The axis of the smaller branches is amber colored, and transparent in the small branchlets.

Panama, rare. F. H. Bradley. Also at Mazatlan and Acapulco.

Gorgonia (Leptogorgia) **rigida** Verrill, l. c., p. 32.

The typical form of this species seems to be rare at Panama, only one specimen occurring in Mr. Bradley's collection. There is a form, however, quite common, that may be distinct:

Var. **lævis**, *nov.*

This forms rather tall, somewhat fan-shaped clumps of long, slender branches, with very small cells, which seldom rise above the surface into verrucæ. The cells are one half smaller than in the typical form, the branches more slender, more regular and smoother. The height is often eight or ten inches, the branchlets .05 to .08 in diameter, color white, pink or purple. Panama, common. F. H. Bradley.

In a recent work, Dr. Kölliker has united *Leptogorgia*, *Rhipidogorgia*, *Lophogorgia*, *Xiphigorgia*, *Pterogorgia* and some other forms to *Gorgonia*. So far at least as the first three forms are concerned, this seems to be a useful improvement, which we are fully prepared to adopt, there being no well marked lines of separation between them in the form and structure of the coral or of the spicula. For the present, however, we think it useful to retain these names for sections of the genus.

Gorgonia (Rhipidogorgia) **Agassizii** Verrill, l. c., p. 32.

Panama, common. F. H. Bradley. Also common at Acapulco, Cape St. Lucas, Socoro Islands.

G. (Rhipidorgogia) **media** Verrill, l. c., p. 33.

Panama, rare. F. H. Bradley. Also at Acapulco.

G. (Rhipidogorgia) **stenobrachis** Val.

Panama, common. F. H. Bradley. Also at Acapulco and Mazatlan.

Muricea acervata *sp. nov.*

Corallum arborescent, with thick, rigid branches, a third of an inch in diameter, and two or three long, rounded or somewhat clavate at the ends, and often crooked. The trunk is stout at base, and soon divides into two or three main branches, and these give off irregularly at distances of from one to two inches, branches nearly as thick, which diverge at nearly right angles at first, and then turn upward with a broad curve; from the outer side of the curve, another branch often arises. The axis is round and black, somewhat compressed at the axils, brittle at the ends; the cœnenchyma is about a line thick, of coarse texture. The verrucæ are crowded, very large, and project at right angles; they are eight-rayed at the summits, which are somewhat enlarged, and .08 of an inch in diameter; their length being .1; their exterior is covered with long fusiform, rather sharp spicula, which are covered with fine granulations. Height of largest specimen eight inches; color when dry, dark yellowish brown.

Panama, not common. F. H. Bradley.

Muricea hispida *sp. nov.*

Corallum branching somewhat in a plane, the branches curving outward, and then rising perpendicularly upward, new branches rising successively from the outer curvature of the branches. Branches slender, enlarging to the ends, with thin cœnenchyma, but with large and very prominent, turbinate verrucæ, with prominent and sharp spines projecting at their summits. Axis round, very slender, black at the base, transparent and amber colored near the tips. The cœnenchyma and verrucæ consist almost entirely of spicula, which are long, slender, fusiform, very sharp at the ends, which project at the ends of the verrucæ, and on their sides, where the spicula are imbricated and about half their length.

Diameter of the branches, exclusive of verrucæ, .12 of an inch; length of verrucæ .15; height of largest specimen four inches. Color when dry, umber brown.

Panama, rare. F. H. Bradley.

Resembles the following species, but has even larger and more prominent verrucæ, which project at right angles, and are much more spiny.

Muricea echinata Val.

Panama, common. F. H. Bradley. Color deep reddish brown. Varies much in size.

Muricea hebes Verrill, l. c. p. 36.

Panama, not very common. F. H. Bradley. Occurs also at Acapulco.

Muricea robusta Verrill, l. c. p. 36.

Panama, common. F. H. Bradley. Found also at Acapulco. The color when dry, varies from white to brown.

Muricea appressa Verrill, l. c. p. 37.

Panama, very common. F. H. Bradley. The color when dry, is either dark brown or grayish yellow.

Echinogorgia arbuscula *sp. nov.*

Corallum with a broad, spreading, encrusting base, extending beyond the horny secretion, and covered with verrucæ. From this arise from one to twelve stalks, which branch closely in an irregularly dichotomous manner, forming close, dense clumps, often with crooked branches, which occasionally coalesce. Branches .12 to .15 of an inch in diameter, blunt at tips, with prominent, closely crowded, somewhat oblong, verrucæ, .03 or .04 in diameter, and about the same in height. Surface coarsely granulate with red spicula. Axis rather stout, black and rigid, somewhat compressed. Height of largest specimens six inches. Color bright red. Young specimens have a basal expanse resembling *Sympodium*, the first stalks are clavate, and often three inches high before branching.

Panama, not rare. F. H. Bradley.

Sympodium Pacifica *sp. nov.*

Corallum spreading over the surface of dead shells, forming bands .3 of an inch wide, and rather thin, with scattered verrucæ, which are large and quite prominent (about .1 inch in diameter). The color is deep red, inclining to orange.

Panama, common. F. H. Bradley.

Zoanthus (Mammilifera) **Danæ** LeConte, Proc. Phil. Academy of Nat. Sciences, Vol. v. p. 320, 1851.

Panama, J. L. LeConte.

Porites Panamensis *sp. nov.*

Corallum glomerate, encrusting rocks, or forming nearly globular masses, with an irregular, lobed exterior. Texture rather loose and porous. Cells of moderate depth, with thin walls covered with fine spinose processes. Septa twelve, distinct, composed of united trabeculæ, the surface covered with small, spine-like points, and appearing slightly thickened. Open spaces between, broader than the septa, which mostly unite at their inner edges, and surround a small open central space, around which are five or six slender, spinose pali. Color of coral, ash brown.

Diameter of the cells about .04 inch; thickness of the largest specimens 2 inches.

Pearl Islands, Bay of Panama. F. H. Bradley.

STEPHANOCORA *gen. nov.*

Cells moderately large, with one or two cycles of septa, which are deeply toothed at the edge, well developed, and mostly confluent with those of adjacent cells. Walls indistinct or wanting, the divisions between the cells indicated only by small, granular points, which sometimes interrupt the septa of adjoining cells. Columella papillose. Paliform papillæ before all the principal septa, the inner ones becoming confounded with the columella.

This genus is allied to *Synaræa* nobis, and *Psammocora*, but differs from the first in the well developed septa, and other characters, and from the last, in having papilliform pali and columella, etc.

Stephanocora stellata *sp. nov.*

Corallum forming rounded clumps of short, irregularly lobed and contorted branches, which are very unequal in size and form, sometimes nearly simple and angular, with a large cell at the top, at other times, even on the same clump, having the summit very much expanded, so as to form flattened, contorted lobes, with acute summits and lateral crests, or even mæandriniform lobes. The branches are usually about an eighth of an inch distant, sometimes more, the sides covered with rather large, starlike, shallow cells, one, or several, larger than the others, often terminating the branches, which appear to increase by the upward extension of one of the edges of these cells by submarginal budding. Septa twelve to sixteen, often with others rudimentary, rather thick and strong, with sharp, spiny granulations or teeth, on the sides and edges, and mostly confluent with those of adjacent cells.

Diameter of larger cells .1 of an inch; height of coral 3; length of living portion of branches .25 to .45. Color of coral, yellowish gray.

Panama and Pearl Islands. F. H. Bradley.

Astrangia Haimei *sp. nov.*

Corallum encrusting, consisting of prominent cylindrical corallites, sometimes rising more than a quarter inch above the surface of the basal expansion which connects them together, and becoming slightly turbinate, and divergent when highest.

The corallites are distant from each other from .04. to .25 of an inch. The basal mural expansion is very thin, compact, and slightly granulated, having a smooth appearance, and usually without apparent striations. Septa from thirty to forty, very narrow, with the inner edges perpendicular, forming a deep cup, broad at the bottom; they are all of nearly the same width, except those of the last cycle, which are more narrow, giving an even appearance to the cavity of the cup; they project slightly above the walls, about .02 inch, in the form of sharp points, alternately larger and smaller; inner edges are thin, evenly and sharply dentate, the sides strongly granulated, and not crowded together, the spaces between being about equal to their thickness. The columella consists of numerous even papillæ, passing into the teeth at the base of the septa. Walls exteriorly with even, thick costæ on the upper part, mostly disappearing towards the base.

Diameter of cup .1 to .12 of an inch; depth .06 to .09; height of corallites usually about .08, sometimes .15.

Panama on reef, common. F. H. Bradley.

Astrangia pulchella *sp. nov.*

Corallum consisting of large patches of small, low, cylindrical corallites, scattered at distances, varying from less than their diameter to more than a quarter inch, and connected together by a thin calcareous, basal expansion, much as in the preceding species, but smoother and with only minute granulations. Cups shallow, conical, with a narrow centre, their whole inner surface crowdedly papillose, the columella being confused with the teeth of the septa, and very small. Septa twenty-four, projecting very slightly above the wall, narrow at the top, but broad within, all nearly equal, the edges evenly toothed, and the sides strongly granulated, so that the granules of adjacent septa often touch, giving them a crowded appearance. Costæ scarcely apparent, even at the border. Diameter of the cups .08 to .1 of an inch; depth .03; height .05, sometimes more.

Panama, with the last, common. F. H. Bradley.

Astrangia concinna *sp. nov.*

Corallum consisting of clusters of broad, low, cylindrical corallites connected by a thin basal expansion, and distant about their own diameters. Cups not so deep as wide, subconical, with a narrow papillose columella forming the bottom. Septa from thirty-six to fifty, subequal, the primaries often a little broader, and those of the last cycle narrower than the rest. All are rounded at the top, and finely toothed, but at the middle the inner edge becomes more nearly perpendicular, and has longer teeth resembling pali, which blend with the columella. The tops of the septa are thin, and project slightly above the wall, the primaries most so. Their sides are not so strongly granulated as in the preceding species, and they appear thinner, and less crowded. Exterior granulated, and slightly costate near the summit, often encrusted with Bryozoa, etc., to near the top. Diameter of cups .15 to .18 of an inch; height .10 to .15.

Panama, not common. F. H. Bradley. Resembles the last, but has much larger cells, and more numerous septa.

Astrangia dentata *sp. nov.*

Corallum forming clusters, encrusting rocks, resembling the last, with cups of about the same size and height, but these are deeper and less open. Septa from thirty-six to forty-eight, very unequal according to their cycles, the primaries being comparatively broad and rounded above, while those of the last cycles are very narrow and rudimentary. All the septa are strongly and irregularly toothed, the principal ones especially so, the teeth on the upper part being largest. Columella much reduced, formed by a few papillæ. Septa unequally projecting, according to the cycles, the primaries about .02 of an inch. Walls thin, with subequal, low, but thick costæ, which extend often on the surface of the basal expansion, which is often encrusted nearly to the summit of the cups with sponge, etc.

Panama, rare. F. H. Bradley.

Astrangia costata *sp. nov.*

Corallum consisting of from one to four turbinate, rather high corallites surrounded by a very thin mural expansion, encrusting usually dead shells. Cup circular, narrow and deep. Septa twenty-four to thirty, the primaries wide, about one fourth the diameter of cup, rounded and subentire at the top, perpendicular and toothed within; the others similar, but successively narrow, with sharp teeth throughout. The septa project very unequally, giving a notched appearance to the margin of the cells. Walls very thin, with subequal, elevated costæ, which extend to the base, and on the basal expansion. The columella is very small, of few papillæ. The septa within the cell are thin, and not crowded, the spaces between them being greater than their thickness, giving them a loose appearance. Diameter of the cups .08 to .1 of an inch; height .10 to .15 inch.

Panama, common. F. H. Bradley. Very distinct from all the others, and approaches *Phyllangia*.

Phyllangia dispersa Verrill, l. c. p. 47.

Panama, not common. F. H. Bradley.

Ulangia Bradleyi *sp. nov.*

Corallum in all the specimens observed, consisting of single corallites without apparent connection, which are subcircular, low, and broad, encrusted exteriorly by sponges, etc., to very near the top, but apparently without a true epitheca. Cup shallow, the centre occupied by a moderately developed papillose columella, from which the septa rise gradually to the edges, the primaries and secondaries much wider than the rest near their summits and broadly rounded, and like the rest, rising at this place perpendicularly to the rounded part, which is less strongly toothed than their inner portions. There are five complete cycles of septa, those of the first three project considerably above the wall, the others less so. All of them are thin, and have spaces between them equal to their thickness. The wall is very thin and costate, in young specimens rudimentary, or wholly wanting, while the septa are well developed. Greatest diameter .6 of an inch: height .25; depth of cup .15.

Panama, rare. F. H. Bradley.

On the Polyps and Echinoderms of New England, with Descriptions of new Species. By A. E. Verrill.

The object of the present paper has been to enumerate the species found upon this section of our coast, as far as known to me,* with the view of illustrating their geographical distribution. It has also been found necessary to introduce remarks, in part explanatory of necessary changes in nomenclature, and for a clearer distinction of some of the species, which have never been properly described. I regret that the length of the article could not be extended so as to include full descriptions in all such cases. Doubtless many species remain to be discovered when more dredging has been done in deeper water. The southern portion of this region, having a sandy shore, is unfavorable for the development of numerous species of Echinoderms and Polyps. In Long Island Sound the water is generally shallow, the depth seldom exceeding twenty fathoms, and usually much less, while a large portion of the bottom, away from occasional rocky shores, is composed of soft argillaceous mud, or fine sand, and therefore suited to very few species of Radiata.

* Although most of the specimens and notes used in the preparation of this paper have been gathered by myself in various excursions on most parts of the coast, I am happy to acknowledge essential aid from Dr. A. S. Packard, Jr., by specimens from Labrador, and the loan of valuable European types; from F. W. Putnam by the use of the specimens in the Essex Institute; and from this Society by the use of the specimens in its valuable collection.

The Acalephs of this region have been noticed by Mr. A. Agassiz in these Proceedings, Vol. VIII. p. 224, and in other publications. More recently in the Illustrated Catalogue of the Museum of Comp. Zoölogy, Vol. II. p. 221, he has presented the subject more fully. The geographical distribution of the Acalephs agrees to a considerable extent with that of the groups now under consideration, but we find no reason for considering the Bay of Fundy a zoölogical region distinct from Massachusetts Bay on one side, and Nova Scotia on the other. Possibly this discrepancy may be due to the lack of sufficiently numerous observations upon the Acalephs at various points along that portion of the coast.

The present groups indicate that there are portions of three distinct Faunæ to be distinguished on the coast of New England, viz.: First, that known as the Virginian Fauna, extending from Cape Hatteras, Va., to the southern side of Cape Cod, which is in many respects closely related to the Carolinian Fauna, farther south, many species being identical; while in its northern portions, some species belonging properly to more northern faunæ, occur. Second, that known as the Acadian or Nova Scotian Fauna, which extends along the shore from Cape Cod to the mouth of the St. Lawrence River, and includes the greater part of the Gulf of St. Lawrence; the shallower parts of the Bay of Fundy, and the waters of the coast of Maine; Massachusetts Bay, and many of the banks to the southward of Cape Cod, such as Nantucket Shoals; and, perhaps, the extreme eastern end of Long Island, where many of its characteristic species of shells, etc., occur. Off the coast of New Jersey, also, there are deep-lying banks or shoals, which may be referred to this fauna on account of northern species found there, but as there are also several peculiar species, they may prove, when better known, to be deep water localities, belonging rather to the Virginian. Third, a more arctic Fauna characterizes the eastern coast of Labrador and Newfoundland, and the Grand Banks, which extends far southward along our coast in deep water, influenced by the polar current of cold water, which skirts the northern part of our coast. This includes most of the banks and deep-lying shoals off Nova Scotia and Maine, especially the deep waters about the mouth of the Bay of Fundy, and St. George's Bank, which is covered by from thirty to fifty fathoms of water.

In fact, we may consider the marine animals as limited by laws similar to that of land animals, and that an increase in *depth* of water, has the same effect as increase in the *elevation* of land,—that of causing a lower temperature, and consequently bringing northern animals down to lower latitudes than they can inhabit in shallower waters along the shore, thus giving rise to outlying patches of more northern faunæ far south of their proper limits on the coast. This third fauna, having its southern outlyers off the New England coast in deep water, has been termed by Dr. A. S. Packard, Jr., the Syrtensian Fauna.

VIRGINIAN FAUNA.

The following list includes the species found in this region, whether properly pertaining to it, or having their extreme limits here.

POLYPI.

Astrangia Danæ Agassiz.

*A. Danæ** A. and Mrs. E. C. Agassiz, Seaside Studies in Natural History, p. 16, figs. 16 to 20. 1865.

In addition to the localities enumerated in a previous paper.† I have found this species abundant near Thimble Islands, east of New Haven, in ten fathoms, on stony bottom; some patches of the coral are five or six inches across, incrusting stones, etc., and associated with a massive sponge.

On the Carolina coast, a species very closely allied to this (*Astrangia astræiformis* E. & H.) takes its place; another very similar species occurs in the Miocene deposits of Maryland (*A. bella* E. & H.) These three forms would doubtless be united into one species by some writers, the distinctions being slight. Similar differences separate each of the forms from either of the others.

Zoanthus Americanus Verrill, Rev. Polyps, p. 34 and 45.

On a bank off the coast of New Jersey, in thirty-two fathoms, Capt. Gedney.

SAGARTIA *Gosse.*

In the Bulletin of the Museum of Comparative Zoölogy, I have restricted this genus by separating under the name *Cereus* of Oken, *C. bellis* of Europe, which was the original type of Oken. To that genus *C. sol* of the Carolina coast belongs. The genus as restricted

* The species named by M. Edwards and Haime *A. Danæ*, a year later than the same name was given to the present species, is entirely different; the corallites being scattered and connected only at the base. For that species, therefore, I would propose the name *Astrangia Edwardsii*, (see Hist. Nat. des Coralliaires, Vol. II. p. 614).

† Memoirs of this Society, Vol. I. p. 1, wherein the synonymy of all the species of Polypi of this coast is given, with descriptions.

has not hitherto been observed on our coast, although abundantly represented on the coast of Great Britain.

Sagartia leucolena Verrill, *sp. nov.*

Column subtransparent, long, slender, and cylindrical in expansion, with a narrow base, adherent to rocks. Tentacles numerous, in full expansion very long, more than twice the diameter of body, and slender, tapering to the point, semipellucid. One of the primary tentacles in the longitudinal plane (opposite one end of the mouth) is much longer than the others, and when extended reaches far above them, and is often differently colored, being sometimes tipped with white. This is not constantly extended, and is ordinarily not very apparent. Cinclidæ distinct, appearing like minute, dark colored spots when partly contracted, arranged in vertical rows, not numerous, much scattered.

"Acontia" not observed to be thrown out of the cinclidæ; but occasionally, when in a sickly condition, a few are thrown out of the mouth, appearing like fine white threads. Surface of the body with light colored longitudinal lines, or sulcations opposite the internal radiating lamellæ, and when not fully extended, marked with fine transverse muscular wrinkles; no suckers apparent. Mouth with ten prominent, little, rounded lobes on each side, lighter colored than the disk. Color of body usually light salmon, or flesh-color; disk similar, with fine white radii; tentacles pellucid white exteriorly, usually with a dark centre, which nearly disappears when fully extended, each side of the base ordinarily has a patch of greenish or brown; these usually run to a point on the disk, and meet, or nearly so, on the inner surface of the tentacles, not far above the base.

The largest specimen observed, when in full expansion, was 2.5 inches high, about .4 inch in diameter, with tentacles more than an inch long, forming a very graceful tuft at the summit of the slender body. This species does not ordinarily contract into a flat or conical form, but becomes short and cylindrical, often with the summit swollen, and globular.

Found under stones near New Haven Light, Long Island Sound, and in New York Harbor.*

This beautiful and graceful Actinia often attaches itself by its narrow base to a stone somewhat beneath the surface of the sea-bottom, and rises up to the surface, in expansion, to display its tentacles. Most frequently it adheres to the under surface of stones of moderate size, where there are spaces below. It occurs from half-tide mark to low water, abundantly. In confinement it is very hardy, and thrives well in an aquarium, remaining in expansion a great part of the

*My attention was first called to this species by Prof. D. C. Eaton, who discovered it several years ago.

time, but most fully at night. It seems more indifferent to changes in the density of the water, and in temperature, than any species with which I am acquainted. It occurs associated with *Metridium marginatum*, and might be at first mistaken for the young of that species, but differs greatly in habit and structure. It has absolutely longer tentacles than the largest specimens of the latter, and lacks the fringe of small ones at the border, as well as the fold of the column, which in the other appears in specimens that are less than a quarter of an inch in diameter. The body is also much more slender and elongated, and the base more narrow.

This species bears some resemblance to *Sagartia viduata* Gosse, of Europe; more nearly to the living specimens as I have seen them at the Aquarial Gardens in Boston, than the figures in Gosse's Actinologia, but it differs essentially from that species, both in color and proportions.

Sagartia modesta Verrill, *sp. nov.*

Column cylindrical in expansion, stouter than in the last species, and with denser walls, which have not the semi-transparency of the latter. In contraction it becomes short, cylindrical, about twice longer than broad; in full expansion four or five times as long as broad. When partly contracted, a distinct fold of the surface near the upper margin sometimes projects above the disk. Base well developed, more so than in the preceding species, scarcely broader than the body, adhering to stones, etc., readily and firmly. Tentacles about sixty in number, marginal, moderately slender, tapering, rather short, less than the diameter of the disk. Color pale grayish; the tentacles lighter with a dark stripe down each side, enlarging at the base into two rounded, blackish, lateral spots, and also widening into broader spots of dark color at two points between the basal spots and the ends of the tentacles; the spots of the opposite sides nearly touching on the inner surface, leave thus a central light stripe alternately narrow and broader; between the constrictions are usually flake-white spots. Disk yellowish white, with darker radii.

Mouth lobes small, but quite prominent, about eighteen in number. Length, of the only specimen seen in expansion, 2.5 inches; diameter .6; length of tentacles .4 inch.

Goose Island, Long Island Sound, under stones at low water mark; not common.

Metridium marginatum Edw. and Haime.

"*Actinia plumosa*" and "*A. senilis*" Couthouy, Boston Journal Nat. Hist. Vol. II. p. 57. *Metridium marginatum* Tenney, Natural History, p. 523, figs. 515 to 517, 1865; A. and Mrs. E. C. Agassiz, op. cit. p. 7, figs. 2 to 7; Clark, Mind in Nature, p. 57 and 178, figs. 28, 106, 107, 1865.

This species occurs quite commonly on the shores of Long Island Sound, in rocky places, near New Haven, and along the whole coast of Connecticut. It is found both under stones and in crevices of ledges, but is usually of small size, if compared with specimens from Maine and Grand Menan, and is almost always of a dull yellowish brown color.

Actinia (?) rapiformis Lesueur.

I have been informed that a species answering to the description of this has been found on the coast of Connecticut, in sandy places, but have seen no specimens.

Halocampa albida (Ag. *sp.*) Verrill.

H. albida A. and E. C. Agassiz, l. c. p. 16, fig. 15.

Abundant at Nantucket on sandy or muddy shores.

Ilyanthus (?) neglectus Leidy *sp.* New Jersey coast, in mud.

The following species can not, perhaps, be said to have been found within the proper limits of this fauna, but since a species of *Cyanea*, which I can not distinguish in any way from *C. arctica*, although it is probably the same that has been named *C. fulva* by Agassiz, occurs abundantly on the whole southern coast of New England, it is probable that its parasite, *Peachia*, will be found also, when carefully sought for.

Peachia parasitica Verrill.

Bicidium parasiticum Agassiz; Verrill, Revision of Polyps, in Memoirs Boston Soc. N. H., Vol. I., p. 31, plate I, figs. 14, 15; A. and E. C. Agassiz, in Seaside Studies in Natural History, p. 15, fig. 14, 1865.

Further examinations of this curious species have led me to believe that it is not generically distinct from the typical species of *Peachia*. The minute suckers of the sides are apparently of precisely the same nature, the basal opening is the same in each, and the structure of the walls, tentacles and disk, is nearly identical with that of *P. triphylla* Gosse, while the lobes about the mouth do not differ more in form from those of *P. hastata*, than the other species differ among themselves. The chief peculiarity is found in its habit of living among the mouth folds of *Cyanea arctica*. But as the habits of some of the European species are still unknown, this may not even prove an exception. A species of *Peachia* has even already been indicated as parasitic on Medusæ in the seas of Northern Europe. It may also be that our species does not live exclusively in this situation, its full history and embryology being still unknown.

The genus *Siphonactinia** is also very closely allied to this. *S. Bœckii*, its type, is very much like the present species in form and structure.

Gorgonia (Leptogorgia) **tenuis** Verrill.

The localities for this species are still imperfectly known. A fine specimen in the Yale College Museum is supposed to have come from Long Island Sound.

ECHINODERMATA.

Antedon (Alecto) **dentata** Say *sp.*

Alecto dentata Say, Jour. Phil. Acad. V. p. 153, 1825.

Great Egg Harbor, N. J., Say. Possibly this may prove identical with *A. meridionalis* Ag. sp., from the Carolina coast.

A. Milberti (Comatula Milberti J. Müll., Mem. Berlin Acad., 1849) from "North America" I have not seen.†

Ophiura olivacea Lyman.‡

? "*O. echinata* Lamk.?" Say, l. c. 147. *O. lacertosa?* Gould, Inv. Mass. p. 345. *Ophioderma olivaceum* Ayres, these Proc. Vol. IV., p. 134, 1851.

This species occurs at low water among eel-grass (*Zostera*) on sandy shores, from Dartmouth, Mass., to Beaufort, N. C. Mr. Say indicates a species, probably the same, from Cape May. It has not been observed north of Cape Cod.

Astropecten vestita Lütken.

Asterias vestita Say, Jour. Phil. Acad. V. p. 143, 1825.

Say's specimen was from Cape May, collected by Mr. J. Robbins. I am not aware of any other being found.

Asterias (Asteracanthion) **arenicola** Stimp.§ These Proc. Vol. VIII. p. 268, 1862.

* Danielssen and Koren, Fauna litt. Norveg. 2nd Liv. p. 87. pl. 12, figs. 4, 5, 6, 1856.

† The name *Antedon* Freminville, 1811, for this genus, has precedence of *Alecto* Leach, 1814, and *Comatula* Lamarck, 1816.

‡ T. Lyman. Illustrated Catalogue of the Museum Comp. Zoöl., Vol. I, 1865. In this work all our species of Ophiurans are well described.

§ There appears to be no good reason for rejecting the Linnean name, *Asterias*, for this genus with *A. rubens* Linn. as the type. *Asteracanthion* Müller & Troschel is synonymous with *Asterias* as restricted and adopted by Gray, and by Dr. Stimpson, and many others. The use of *Asterias* in botany, anterior to its employment by Linnæus, alluded to by Dr. Lütken (Grönlands Echinoderms, p. 28) should not

Asterias spinosus (*pars*) Say, l. c. p. 142.

This species, well described by Dr. Stimpson, is very abundant in Long Island Sound in six to twelve fathoms, muddy bottom, and also occasionally at low water. It extends southward to South Carolina and Georgia. Its color, when living, is dark green, with a bright orange madreporic plate. Occasionally it is brownish.

Asterias (Asteracanthion) **compta** Stimp. l. c. p. 270.

Found on a bank off the coast of New Jersey in thirty-two fathoms, associated with *Zoanthus Americanus*, *Eupagurus pubescens*, etc. Whether this locality belongs to a southern extension of the Acadian Fauna, or is one of the few known, deep-water localities of the Virginian Fauna seems somewhat doubtful.

Echinarachnius parma Gray.

Scutella trifaria Say, l. c. p. 227, 1826. *E. atlanticus* Stimpson, Inv. Grand Menan, p. 16. *E. parma* Tenney, Nat. Hist. p. 501, fig. 485; A. and E. C. Agassiz, l. c. p. 107, fig. 139, 140, 1865.

This species occurs frequently on sandy bottoms, in six to twelve fathoms in Long Island Sound, off New Haven. Also near the northern shores of Long Island. It is far more abundant and larger in the Bay of Fundy, and northward to Labrador.

Echinocidaris Davisii A. Ag. Bulletin, M. C. Z. p. 20, 1863.

On rocky shores of Long Island Sound, Naushon, Mass., Mrs. Watson; Newport, R. I., etc., Museum of this Society.

Euryechinus granulatus Verrill.

Echinus granularis (*pars*) Say, l. c. p. 225, 1826 (*non Lamk.*). *E. granulatus* (*pars*) Gould, l. c. p. 344, 1840; Stimpson, Inv. p. 15 (*pars*). *Toxopneustes dröbachiensis* (*pars*) A. Agassiz, l. c. p. 23. *T. granulatus* Lütken, Bidrag til Kundskab om Echiniderne, p. 80, 1864.

Under the names first quoted, nearly all the American writers seem to have confounded two closely allied species, which have been for the first time distinctly separated by Lütken in the work cited.

be considered an objection to it, since it is useless to go back of the origin of the binomial system to establish names, and besides this, the double use of a generic name in Botany and Zoölogy, although certainly undesirable, is not usually regarded as a sufficient reason of itself for changing it; otherwise, we should be obliged to change hundreds of names so employed at the present time. The names *Uraster* Agassiz, and *Stellonia* Nardo, also, have the precedence of *Asteracanthion*.

This species occurs in Long Island Sound, off New Haven, where I have never observed *E. Dröbachiensis*, which is the most common species on the coast of Maine, Newfoundland and Labrador. But both species occur together in Massachusetts Bay, and as far north, at least, as Halifax, N. S.

In this species the interambulacral tubercles are relatively larger, more crowded, and more uniform in size than in *E. Dröbachiensis*, the latter having two rows of tubercles, both in the ambulacral and interambulacral regions, which are much larger and higher than the rest, and rather distant, like the other principal interambulacral tubercles, while among them are scattered very numerous small tubercles (miliaries). In *E. granulatus* the four corresponding principal rows are less distinct from the other tubercles, many of which are nearly as large; the larger tubercles are relatively much more crowded, and there are fewer miliaries. In each species the ambulacral pores, varying from four to six pairs, are in oblique and somewhat irregular arcs, or rows, but the rows are shorter, and the pores more crowded, in *E. granulatus*. The spines also, though variable, are usually stouter and shorter in this species than in the other, in which, also, they are (particularly the small ones) much more numerous on specimens of the same size. The form of the shell varies greatly in each, but is frequently more elevated in *E. granulatus*.

NOTE.—The genus *Toxopneustes* was first proposed by Prof. Agassiz in July, 1841, Monographies d'Echinodermes, 2[me] liv. p. 7, (Introduction), where *Echinus pileolus* Lamk. is stated to be the *type* of the genus. At the same time several other genera were proposed, the type of each being stated, a method of establishing genera that has been practised extensively, among Echinoderms, and which is still adopted by some writers.* Afterwards, in the Catalogue Raisonné, by Agassiz and Desor, 1847, the genus *Boletia* was established with the same species for its type, by Mr. Desor, while *Toxopneustes* was applied to the group including *E. brevispinosus* and *E. Dröbachiensis* Müll., which represent two genera, both widely different from *E. pileolus*. It is, therefore, evident that, in accordance with the usual rules of priority in nomenclature, the name, *Toxopneustes*, must be retained for the genus *Boletia* of Desor, his name becoming a synonym, and a new name must be adopted for the present group, having *E. Dröbachiensis* as its type.† In the Introduction to Liv. 4[e], Monog. Echin. p. ix, Dec. 1841, Prof. Agassiz briefly described *Toxopneustes*, and cited *Echinus tuberculatus* as the type, while the typical species of the present genus were united to *Echinus proper*.

* See, for example, the genera *Lytechinus*, *Gymnocidaris*, *Orthocidaris*, *Prionocidaris*, *Toxocidaris*, etc., in the Bulletin Mus. Comp. Zoölogy, No. 2, by A. Agassiz, 1863.

† The other species of *Eurypechinus*, excluding some doubtful forms, are *E. viridus* of the Mediterranean; *E. gibbus* (Val. sp.) of Gallipagos Is.; and *E. Delalandii* (Val. sp.) of New Holland.

Synapta tenuis Ayres, these Proc. IV, p. 11, Feb., 1851.

Synapta Girardii Pourtales, Proc. Am. Assoc. 1851, p. 14. *Synapta tenuis* A. and E. C. Agassiz, op. cit. p. 95, figs. 124, 125.

At low-water mark, sandy shores, Sag Harbor, L. I., Dr. Ayres. Also in Massachusetts Bay.

Sclerodactyla Briareus Ayres, op. cit. p. 6.

Holothuria briareus Lesueur, Jour. Phil. Acad. IV, p. 161, 1824. *Anaperus carolinus* Troschel. *Anaperus carolinus* and *A. Bryareus* Pourt. l. c. p. 10.

Sag Harbor, L. I., among eel-grass on muddy shores, Dr. Ayres. New Jersey, Say; S. Carolina and Florida. Lesueur's specimens were from Florida. Possibly two species are confounded under this name. I have seen no Florida specimens.

ACADIAN FAUNA.

The following list embraces all the species known to me inhabiting this fauna, as limited above. The species that have been found only in deep water (below thirty fathoms) off the coast of Maine, and at St. George's Bank, are included in the Syrtensian fauna.

POLYPI.

For the synonymy and descriptions of all the following species, as well as more complete notices of localities, reference may be had to my Revision of Polyps, etc., Memoirs of this Society, Vol. I, 1864.

Bunodes stella Verrill.

Cape Elizabeth, Me., to Grand Menan. Littoral.

Rhodactinia (Tealia) **Davisii** Agassiz.

South Shoals, Mass., to Labrador. Littoral to thirty-five fathoms. A comparison of living specimens may, quite probably, establish the identity of this species with *T. crassicornis* of North Europe.

Metridium marginatum Edw. and H.

New York to Labrador. Littoral to thirty fathoms.

Ilyanthus lævis Verrill.

Eastport, Me.

Edwardsia sipunculoides Stimp.

Machias, Me.; Eastport, Me.; Grand Menan. Littoral.

E. sulcata Verrill.

Chelsea Beach.

Arachnactis brachiolata A. Ag.

Nahant, Mass. Floating on the surface of the water.

Peachia parasitica Verrill.

Cape Cod to Bay of Fundy. Parasitic on *Cyanea arctica.*

Alcyonium carneum Agassiz.

Cape Cod to Breton Island, N. S. One to twenty-five fathoms.

Echinodermata.

Antedon Eschrichtii (Müller *sp.*)

Alecto Eschrichtii Müll. and Tr. 1841; Stimpson Inv. Gr. Menan, p. 12.

Near Grand Menan, twenty-five fathoms, shelly bottom, Dr. Wm. Stimpson.

Ophioglypha Sarsii Lyman.

Ophiura Sarsii Lütken. *Ophiolepis ciliata* Stimp. op. cit. p. 13.

Massachusetts Bay to Greenland, Northern Europe; coast of Norway; Great Britain. I have taken it in Frenchman's Bay, Me., in twelve fathoms, shelly bottom, and at Eastport, Me., of large size, sparingly, in fifteen to twenty fathoms, stony bottom.

Ophioglypha robusta Lyman.

Ophiolepis robusta Ayres; Stimpson, op. cit. p. 13. *Ophiura squamosa* Lütken.

Massachusetts Bay to the Arctic Ocean; Greenland; Northern Europe; coast of Denmark.

I have dredged it quite frequently in fifteen to twenty fathoms, stony and shelly bottom. Eastport, Me., and have, also, often found it among rocks and nullipores at low-water mark of spring tides, both at Eastport and Grand Menan.

Amphiura squamata Sars.

Ophiolepis tenuis Ayres; Stimpson, op. cit. p. 13.

From Massachusetts Bay to the Arctic Ocean; Northern Europe; England; Mediterranean.

At Grand Menan, below low-water, among Nullipora, frequent, Stimpson. I have dredged it sparingly at Eastport, Me., in twenty fathoms, shelly bottom.

Ophiopholis aculeata Lütken.

"*Ophiura lacertosa?*" Couthouy, Boston Jour. Nat. Hist., Vol. II, p. 57. *Ophiura aculeata* Gould, l. c. p. 345. *Ophiocoma aculeata* Desor, these Proc., Vol. III., p. 67. *Ophiopholis scolopendrica* Stimp. op. cit. p. 13. *Ophiopholis bellis* Lyman, op. cit. p. 96, pl. 1, figs. 4 to 6; Tenney, op. cit. p. 504, fig. 489; A. and E. C. Agassiz, op. cit. p. 115, figs. 148 to 150.

This beautiful and variously colored species* ranges from Vineyard Sound and Cape Cod, Mass., to the Arctic Ocean, and on the coast of Europe from Spitzbergen southward to Denmark and Great Britain. I have found it abundant in Massachusetts Bay, and at Mt. Desert, Me. At Eastport, Me., and Grand Menan, I have obtained it in great numbers among stones, Nullipora and sponges, at low-water of spring tides, and dredged it plentifully in fifteen to twenty fathoms, rocky bottom, among Nullipora, sponges, Ascidia, Boltenia, etc. Codfish devour great numbers of them.

Astrophyton Agassizii Stimp. op. cit. p. 12.

Euryale scutatum Gould, op. cit. p. 345. *Astrophyton Agassizii* Tenney, op. cit. p. 505, fig. 490; A. and E. C. Agassiz, op. cit. p. 117, fig. 151; Lyman, op. cit. p. 186.

From Cape Cod to Gaspé, Canada East. From low-water to thirty-five fathoms; Boston Harbor, of large size, Mr. Kilby Paige (Coll. this Soc.); Cape Cod, Capt. N. E. Atwood. I have obtained it at Grand Menan in thirty fathoms; at Eastport, Me., at low-water of spring tides among rocks (mostly small specimens), and abundantly, of all sizes from half an inch to eighteen inches or more in diameter, in fifteen to twenty fathoms, shelly and stony bottom. The very young ones were mostly clinging to the branches of *Alcyonium carneum* Ag. It is often brought up on fish lines.

* It seems unnecessary to supplant the name (*aculeata*) given to this species by Retzius, in 1783, and Müller, in 1789, by *bellis*, which was given in 1733 by Linck, before the binomial system was established, and not as a part of a binomial name. The former appears to have priority under the binomial system.

Ctenodiscus crispatus Dub. and Koren.

Frenchman's Bay, near Mt. Desert, Me., twelve fathoms, muddy bottom.

Cribrella sanguinolenta Lütken.

Asterias sanguinolenta Müller, 1776. *Asterias oculata* Pennant, Brit. Zoöl., 1777. *Asterias spongiosa* Fabr. Fauna Grœn., 1780. *Asterias pertusa* Fabr., 1823. "*Linckia oculata* Forbes," 1839; Stimpson, op. cit. p. 14. *Linckia pertusa* Stimp. l. c. *Cribrella oculata* Forbes, Hist. Brit. Starfishes, 1841; A. and E. C. Agassiz, op. cit. p. 112, fig. 146. *Echinaster oculatus* Müll. and Tr., 1842.

Abundant along the whole coast from Nantucket Shoals, Mass., to Labrador and Greenland, and southward on the European coast to Norway and Great Britain. At Eastport, Me., and Grand Menan, I have dredged it in from five to twenty-five fathoms abundantly, and it is also common at low-water, in all its varieties.

The name *oculata*, sometimes applied to this species, was given by Linck in 1733, before the establishment of the binomial system.

Solaster endeca Forbes, (Linn. sp.)

Common on the coast of Maine, and in the Bay of Fundy, from low-water mark to twenty fathoms. It is less common in Massachusetts Bay. It has about the same range as the last species, northward, and on the European coast.

In the Bay of Fundy, this species is usually deep purple above, and orange below, but one large specimen occurred entirely orange. The rays vary from nine to thirteen.

Crossaster papposus Müll. and Tr., (Fabr. sp.)

Solaster papposus Forbes; Stimpson; Lütken, etc.

This species occurs occasionally in Massachusetts Bay, and is not uncommon in the Bay of Fundy in twenty to forty-five fathoms, rocky bottoms, and occasionally at low-water, especially during spring tides. I have taken specimens six inches or more in diameter, at low-water. It extends northward to the Arctic Ocean and on the coast of Europe to Great Britain.

Asterias (Asteracanthion) **Forbesii** Verrill, (Desor sp.)

Asteracanthion Forbesii Desor, these Proc. III, p. 67, 1848. *A. berylinus* Ag. MS.; A. Agassiz, Embryology Echin. Proc. Am. Acad. 1863; Seaside Studies, p. 108, figs. 141 to 145, 1865.

A comparison of the original specimen of Desor's *A. Forbesii*, belonging to this Society, with specimens of *A. berylinus*, labelled by Mr.

A. Agassiz in the Collection of the Essex Institute, fully demonstrates their identity.

This species has broad, rounded, rather stout rays, which taper rapidly to the obtuse ends, and are somewhat narrowed at the base. Radii of the disk and arms as 1 : 5. The ambulacral pores are relatively more crowded than in *A. arenicola*, though smaller than in that species. The interambulacral plates bear usually two rather long, stout spines, which, as mentioned by Desor, are mostly obtuse, and canaliculate on the outer side; toward the ends of the rays, however, they are mostly merely flattened. Outside the interambulacral plates there is a row of small, thick plates, with wide spaces between. These plates often, though not always, bear each a short spine, forming a row that fades out towards the ends of the rays. External to these is a crowded row of prominent, oblique, stout plates (ventrals), each of which bears usually two, or sometimes three, spines on its oblique prominent portion, and one on a rounded external tubercle alternating with them, thus forming three or four irregular rows of thick, obtuse spines. These are separated from the "laterals" by a well marked, broad space, having large openings between the plates, which become much wider toward the base of the rays, causing the lateral rows to curve rapidly upward toward the dorsal area of the disk. The lateral plates are strong and closely imbricated, bearing two or three principal spines, often with other smaller ones between, forming several closely crowded, irregular rows. External to these, the dorsal area of the rays is covered with rather numerous, short, blunt spines, not arranged in very distinct rows, but a median row is often pretty well marked, though scarcely longer than the others. On the disk the spines are more crowded. The lateral spines are longer than the dorsal, and the ventrals still longer and stouter. The principal dorsal and lateral spines bear crowded wreaths of minute, short, obtuse, minor pedicellariæ. Clusters of larger pedicellariæ are found on the outer surface of the ventral and interambulacral spines. They are also numerously scattered on the surface between the spines. These are short and stout, broad oval, obtuse at the tip. The texture of this is much firmer than that of the following species, owing to the stouter and more numerous plates, especially on the dorsal area. Specimens prepared by soaking in caustic potash, until the soft parts are removed, show this difference very distinctly. The madreporic plate is prominently convex.

A dry specimen, of ordinary size, is 2.9 inches from the centre of the disk to the end of the rays; 0.6 inch to edge of disk; greatest width of rays 1 inch; length of interambulacral spines .13; diameter of madreporic plate .18. This species occurs at the South Shoals, (Desor), and is abundant along the eastern coast of Massachusetts, near low-water mark. The specimens from which the above description was made were from Beverly and Chelsea, Mass. At Eastport, Me., and Grand Menan, it is very rare.

Asterias (Asteracanthion) **vulgaris** Stimpson, MS.

Asterias spinosa (*pars*) Say. Jour. Phil. Acad., v., p. 142, 1825, (not of Linck, which is an *Echinaster*, nor of Pennant). *Asterias rubens* (*pars*) Gould, op. cit. p. 345. *Asteracanthion rubens* Desor, op. cit. p. 67; Stimpson, Inv. Grand Menan, p. 14. *Asterias vulgaris* Stimp. MS., Packard, Canadian Nat. and Geol. Dec., 1863. (?) *Asteracanthion pallidus* Ag. MS.; A. Ag. Embryol. Asteracanthion. Proc. Am. Acad., 1863 (No description). *Asteracanthion* Tenney, op. cit. p. 503. fig. 488.

This species has relatively longer and more gradually tapering rays than the last, with a larger disk. The proportion of the radii is therefore about the same, (1 : 4.5 or 5, in alcoholic specimens, dry specimens being usually so flattened and distorted as to be useless for measurement). Owing to the prominence of the ventral and lateral series of plates and spines, the rays are somewhat angular and depressed, and there is a prominent median row of longer spines on the rays above, often traceable to the centre of the disk. The interambulacral plates bear usually two, slender, elongated, often pointed spines, so placed on alternate plates as to appear in four rows; occasionally on alternate plates there is but one. The ventral and lateral plates are arranged much as in *A. Forbesii*, but the small plates, joining the interambulacral, seldom bear spines, and are smaller, with smaller intervening spaces, and in the angle of the rays beneath, there are from six to ten, or even more, irregular, supplementary plates, crowded together, and mostly without spines, while in the preceding species these are absent or represented only by two or three small pieces. The principal ventral plates are very oblique, prominent, and crowded, bearing each from three to five stout, blunt spines, shorter and much thicker than the interambulacral. The lateral plates are separated from the ventrals by a wide space, with large quadrangular openings, the transverse connecting plates being very slender and broken into distinct pieces. In these openings are clusters of very numerous, small "papulæ" or water-tubes. The lateral plates are smaller than the ventrals, oblong, less oblique, and bear usually two or three short spines, which are much smaller and more pointed than the ventrals, and form a crowded, mostly double row, curving upward near the base of the ray. Exterior to these the lateral and dorsal area is formed of very slender, openly reticulated plates or ossicles, the transverse ones broken into many small pieces, leaving large openings between, with very numerous papulæ, and bearing, at their intersections and elsewhere, short, rather slender spines, which are often acute. The median rows of the rays are quite distinct, formed by longer and larger spines, supported by more prominent, somewhat imbricated plates. The dorsal spines bear close wreaths of minute minor pedicellariæ, which also form dense clusters on the outward sides of the lateral and ventral spines. The major pedicellariæ are elongated-oval, slender, acutely pointed, and very numerous over the whole surface between the spines. On the interambulacral spines they are numerous, and several occupy the angles between the rays beneath. The madreporic plate is broad, rather flat, and finer in texture than in the preceding species. The ambulacral pores are relatively smaller, more numerous and more crowded than in *A. Forbesii.* The color in life is light purple or yellow, the sexes differing and varying with the season.

This species attains a very large size, specimens fifteen inches in diameter and upward being not rare in the Bay of Fundy; a specimen of ordinary size is 4 inches from the centre to the end of a ray; .8 inch to edge of disk; width of rays at base, 1.2 inch.

This species is found from Cape Cod and South Shoals, Mass., to Labrador, and from ordinary low-water mark to twelve fathoms. On the coast of Maine and northward, it is by far the most common species. At Eastport and Grand Menan it is very abundant among rocks at low water, and of large size. Lewiston, Me., in drift clay, one hundred feet above the Androscoggin River, (Coll. this Society).

Under the name of *Asterias spinosa*, Say included a southern species (*A. arenicola* Stimp.) and specimens from Saco, Me., undoubtedly belonging to this species, but his identification with the species of Linck was entirely erroneous, that being really Say's *A. sentus* (*Echinaster spinosus* M. and Tr.). Pennant's *A. spinosa* appears to be *A. glacialis* Linn. The next distinctive name, so far as I am aware, is *A. vulgaris* Stimpson, MS., first published by Packard in 1863, but given by Stimpson some time before. Whether the manuscript name, *Asteracanthion pallidus* Agassiz, applies to this species, I am unable to determine, no description having yet appeared. In the Essex Institute are specimens of this species labelled "*A. rubens*," by Mr. A. Agassiz, and one from Labrador, which is apparently perfectly identical with it, labeled by him "*A. Fabricii* Ag. MS."

This species differs widely from *A. rubens* of Europe, of which I have had a specimen for comparison, preserved in alcohol, and sent by Dr. Lütken to Dr. A. S. Packard. *A. rubens* has stouter and more evenly rounded rays, which are covered above with more numerous, smaller, and sharper spines. The texture is still more loose and pliable. The dorsal median row of spines is much less distinct;

the lateral spines are uniserial, and between them and the principal ventral row, there are scattered many small spines, forming several longitudinal rows; the ventrals are fewer and smaller. The minor pedicellariæ are smaller and much less numerous; the major pedicellariæ are comparatively few, especially on the interambulacral spines, where there is only an occasional one, and smaller.

Asterias (Asteracanthion) **littoralis** (Stimp. sp.)

Asteracanthion littoralis Stimp. Inv. Grand Menan, p. 14, 1853.

Eastport, Me., and Grand Menan, abundant from half-tide to low-water mark, among rocks and fuci. I have observed specimens three inches in diameter, or even more.

Asterias (Leptasterias) **tenera** Stimpson. These Proc. VIII, 269, 1861.

(?) *Asteracanthion flaccida* Ag. MS.; A. Ag. Embryol. Echin. pp. 22 and 29, 1864. (No description).

Whether the species observed by Prof. Agassiz to carry its eggs until hatched, and said to be allied to *A. Mülleri* Sars, which it also resembles in its habits, is this or the following, I am unable to determine, both being allied to *A. Mülleri*, the present one especially so, but as this species was found in Massachusetts Bay, like that observed by Agassiz, I have referred it here with doubt.

Ten miles south of Cape Ann, in twenty fathoms, rocky bottom, Dr. Wm. Stimpson.

At Eastport, Me., in twenty fathoms, I have dredged several small specimens, about an inch in diameter, that appear to be referable to this species.

Asterias (Leptasterias) **Stimpsoni** *sp. nov.*

Asteracanthion Mülleri Stimp. op. cit. p. 14. (Not of Sars).

Rays five, depressed, elongated, tapering regularly to the tips, somewhat angular, owing to the prominence of the median, lateral and ventral rows of spines. Radii as 1 : 4.5 in alcoholic specimens; nearly 1 : 5.5 when dry. Disk small, its radius about equal to the width of the rays at base. Interambulacral spines round and slender, blunt at tip, usually two upon each plate, sometimes alternately one and two. Between these and the ventral series there are no small spines, but toward the disk there is a series of pores, each of which has a single large papula ("water tube"). The ventral plates bear each two or three prominent blunt spines, longer and larger than the preceding, forming a double series of alternating spines along the lower side of the rays. Separated from these by a wide, naked space, with rather large openings, which bear one or two large papulæ, are the lateral plates, each bearing a prominent slender spine, forming a regular row, which curves upward at the base of the ray. Between the prominent, median, dorsal row, and the lateral, there are usually but two longitudinal rows of small, rather scattered spines. The blunt, dorsal spines are placed on somewhat tumid prominences of the plates, and are surrounded at base by close wreaths of minor pedicellariæ, which also form thick clusters on the outer sides of the lateral and ventral spines. The major pedicellariæ are lanceolate and pointed, about twice as long as broad, and are numerous on the dorsal and lateral surfaces between the spines, and on the inner edges of the ambulacral groove; a few are attached singly to the interambulacral spines, one or two are placed in the angles of the rays beneath, and the madreporic plate is surrounded by a circle of spines alternating, irregularly with major pedicellariæ. The spines of the disk are numerous, and concentrically arranged. The texture is firm, owing to the rather stout, imbricated plates which form the dorsal frame-work. Diameter of the largest specimen observed 2.5 inches.

Color reddish purple above, yellow beneath. Eastport, Me., twenty fathoms, stony bottom, not uncommon.

This species is allied to *A. Mülleri* Sars, but differs from a typical specimen sent by Dr. Lütken, in having less slender, and more depressed rays, and in having two rows of interambulacral spines instead of a single series, one to each plate, as in the latter. The spines in *A. Mülleri* are, also, more slender and translucent, and are arranged differently on the dorsal surface. The pedicellariæ, also, are less numerous.

The two preceding species, together with *A. compta* Stimp., and *A. Mülleri*, present so great differences in structure from the typical species of *Asterias*, that it seems to me desirable that they should be separated as a distinct genus, or at least as a natural subgenus, which I designate as follows:

Leptasterias *gen. nov.*

Type *Asteracanthion Mülleri* Sars.

Small starfishes allied to *Asterias*, but having comparatively large papulæ ("water tubes") placed singly (or sometimes in groups of two or three) along the sides and on the back of the rays, where in *Asterias* they are very small, and in crowded clusters. The plates are usually stout and imbricated. The madreporic plate is surrounded by a circle of spines in most, if not all, of the species.

From the observations of Prof. Sars on the typical species, and of Prof. Agassiz upon another species, probably one of those here mentioned, the mode of reproduction differs from that of *Asterias*, the eggs and embryos being carried by the parent until the peculiar metamorphoses have been passed through.

Stichaster albulus Verrill.

Asteracanthion albulus Stimpson, Inv. Grand Menan, p. 14, fig. 5, 1853. *Asteracanthion problema* Steenstrup, 1854; Lütken, Grönlands Echin. p. 30, 1857.

This remarkable species occurs frequently at Eastport, Me., and Grand Menan, in ten to twenty fathoms, rocky bottoms, and among Nullipora; also frequent at low-water of spring tides among rocks.

The specimens are seldom more than one and a half inches in diameter, and usually much smaller. They have mostly three long and three short rays, but occasionally there are four short ones, and sometimes, even in specimens half an inch in diameter, the six rays are equal. Specimens from Greenland sent by Dr. Lütken, under the name of *Asterias problema*, agree perfectly with Eastport specimens.

Variety *nitida*.

A specimen found near Eastport at low-water by Mr. S. I. Smith, is remarkable for its large size and regular form, but presents no peculiarities that may not be considered as due to increased age. The diameter is four inches; of disk .5; width of rays at base .35. Rays six, equal, evenly rounded, and gradually tapering. The median row of plates quite distinct, with about seven, nearly equal rows on each side, all of them close set and regular. Beneath, there is a ventral row on each side, somewhat more prominent, bearing four or five spines in a transverse row, those next the ambulacra longest; these plates unite directly with the interambulacral plates without any pores between them. The interambulacral plates bear two or three, and sometimes four, long, tapering, rather slender, obtuse spines.

The dorsal plates are crowned by eight to twelve, small, somewhat radiating spines, thicker and more obtuse than those of the ordinary variety. The major pedicellariæ are in a row along each edge of the ambulacral furrows, and there is one below in each angle between the rays, as in the small specimens, and occasionally one on the interambulacral spines. They are small, oval, stout, and rather obtuse. The minor pedicellariæ are very small, rounded, and are numerous on the lateral and dorsal spines, and crowded in large clusters on the ventral spines, chiefly on the side toward the end of the ray. The papulæ are not very numerous, rather large, mostly in pairs. Suckers numerous and much crowded, in four rows.

Echinarachnius parma Gray

Very abundant from extreme low-water to twenty fathoms at Eastport and Grand Menan, on sandy bottoms, half buried in sand. Common from Long Island to Labrador.

Euryechinus granulatus Verrill.

Massachusetts Bay, Grand Menan, Halifax, N. S. Occurs at extreme low-water mark.

Euryechinus Dröbachiensis Verrill.

Echinus Dröbachiensis Müller. *Echinus granulatus* (*pars*) Gould; Stimpson, etc. *Toxopneustes Dröbachiensis* Ag. and Desor, Cat. Rais. 1847; A. Ag. (*pars*), these Proc., Vol. IX, p. 191; Tenney, op. cit. p. 500, figs. 483. 484 (original); A. and E. C. Agassiz, op. cit. p. 102, figs. 131 to 138 (original).

Common from Massachusetts Bay to Labrador and Greenland, and also on the northern coast of Europe, and the northwest coast of North America. Extremely abundant for several feet above low-water mark of spring tides at Eastport, Me., and Grand Menan, on rocky bottoms; and also in ten to twenty fathoms. Small specimens were collected by Dr. A. S. Packard, Jr., in fifty fathoms, Straits of Belle Isle, Labrador. Drift Clay, Portland, Me. A. Agassiz mentioned specimens, probably of this species, from an outlying bank situated off the coast of New Jersey, in about thirty fathoms, Capt. Gedney.

Thyonidium productum Stimp., Inv. p. 17.

Duasmodactyla producta Ayres, these Proc. IV, p. 244, 1852.

Eastport, Me., under stones at low-water, not common.

Thyonidium musculosum Ayres, op. cit. p. 70.

Massachusetts Bay, eighteen fathoms, Mr. Ayres.

Pentacta frondosa Jæg. (Gunner sp.)

Cucumaria frondosa Forbes; Dub. and Kor.; Lütken; Sars. *Pentacta frondosa* Stimp. op. cit. p. 16; A. and E. C. Agassiz, op. cit. p. 100, fig. 130. *Botryodactyla grandis* Ayres, op. cit. p. 52. *B. affinis* Ayres, op. cit. p. 145.

Massachusetts Bay to Labrador and Greenland; on European coast south to Denmark and Great Britain. Exceedingly abundant and large at Grand Menan, at extreme low-water, and for several fathoms lower, covering rocky bottoms. I have also dredged it abundantly at Eastport in twenty fathoms, stony bottom.

The specimens are mostly dark brown or purplish, yellowish below. One specimen occurred at Grand Menan of a uniform, light yellow. Commonly called "Sea Cucumber" on this coast.

Pentacta calcigera Stimp., these Proc. IV, p. 67, 1851.

(?) *Cucumaria Korenii* Lütken. Grön. Echin. p. 4, 1857.

Chelsea, Mass., Dr. Stimpson; Swampscott, Mass., S. Tufts; Labrador, Dr. A. S. Packard, Jr. On this coast, hitherto only found thrown upon the beaches by the waves. Dr. Packard's specimens were dredged in fifteen fathoms, sandy bottom.

Pentacta minuta (Fabr. sp.)

Cucumaria minuta Lütken, op. cit. p. 7. *Ocnus Ayresii* Stimpson, Inv. p. 16, 1853.

Grand Menan in twenty-five fathoms, shelly bottom. Dr. Stimpson.

Psolus phantapus Oken.

Psolus laevigatus Ayres, op. cit. p. 25. *P. phantapus* Stimp. Inv. p. 16; These Proc. IV, p. 67; Bronn, Pl. 47, fig. 4, copied from Cuvier, a poor figure.

Chelsea Beach, Mass.: Grand Menan, at low water and in forty fathoms; and at Eastport, Me., at low-water, buried among pebbles, Dr. Stimpson. I have dredged it at Mt. Desert, Me., in fifteen fathoms, rocky bottom.

The following species has many structural peculiarities that separate it from typical species of *Psolus*, and entitle it to rank as a distinct genus.

LOPHOTHURIA *gen. nov.*

Cuvieria (*pars*) Peron. 1817, (not of Per. and Les. 1811). *Psolus* (*pars*) Lütken, Grönlands Echinod. 1857.

Tentacles ten, arborescent, and greatly subdivided, about as long as the body in expansion. Body covered above by large imbricated plates, with a flat naked surface beneath, with a crowded row of ambulacral suckers on each side, but without a median row, which is imperfectly represented by a crowded group of suckers at each end of the flat surface, mingling with those of the lateral rows. Naked part of the body, below the tentacles, retractile, and having ten vermicular appendages near its junction with the plated portion, corresponding with the ambulacra and tentacles. Tentacles connected at base by a narrow web.

*Psolus** differs from this genus in having a double median row of suckers beneath; in its less branched tentacles, without a basal web; and in having five double rows of slender, sucker-like, ambulacral appendages along the naked part of the body below the tentacles. The anal region is also greatly prolonged.

* Typical specimen of *P. phantapus* from Denmark, in alcohol, with tentacles expanded, sent by Dr. Chr. Lütken.

The genus *Lepidopsolus* (Bronn, Thier. Reichs, II, p. 404) proposed for *P. squamatus* (Müll. sp.) is said to have the suckers scattered beneath, and other characters very different from the present group.

Lophothuria Fabricii Verrill.

Holothuria squamata Fabr. Fauna Grœn; Gould, (not of Müller). *Cuvieria Fabricii* Dub. and Kor.; Stimpson, Inv. p. 16. *Psolus Fabricii* Lütken, Grön. Ech. p. 13. *Cuvieria squamata* A. and E. C. Agassiz, op. cit. p. 98. figs. 127–129 (original). *Psolus phantapus* Clark, Mind in Nature, p. 192. fig. 117 (original, a good figure).

Massachusetts Bay to Greenland. Common in two to eight fathoms in a few localities at Grand Menan, adhering firmly to rocks. Occasionally a specimen of large size is exposed at low-water of spring tides. Young under stones at low-water, A. Agassiz. Rockland Harbor, Me., in five fathoms, C. B. Fuller. Called "Sea-orange" by American fishermen.

Synapta tenuis Ayres.

Sandy beaches of Massachusetts Bay at low-water, not uncommon.

Chirodota læve Grube, (Fabr. sp.)

Trochinus pallidus Ayres, op. cit. p. 243. *Synapta coriacea* Ag. Proc. A. Acad. 1851, (no description). *Chirodota læve* Stimp., op. cit. p. 17; Packard, Can. Nat. Dec., 1863.

Eastport, Me., and Grand Menan, under stones at low-water, common. Labrador in ten fathoms, sandy bottom, Dr. Packard; Greenland, Dr. Lütken.

Caudina (Molpadia) **arenata** Stimp. op. cit. p. 17, 1853.

Chirodota arenata Gould, op. cit. p. 346, 1841; Ayres, op. cit. p. 143; Pourtales, Proc. Am. Ass. 1851, p. 13. *Caudina arenata* A. and E. C. Agassiz, op. cit. p. 97, fig. 126 (original); Clark, op. cit. p. 187, figs. 114 to 116 (original).

Sandy and muddy shores of Massachusetts Bay. Often thrown on Chelsea Beach, Mass., after storms.

This genus is very closely allied to, if not identical with, *Molpadia* Cuvier. (See *M. borealis* in Sars, Norges Ech. tab. 12 and 13).

Doubtful Species.

The following are, as yet, quite obscure, and are, perhaps, synonymous with some of the preceding.

Cucumaria fusiformis Desor, these Proc. III, p. 67. South Shoals, Mass., twenty-two fathoms. *Chirodota oölitica* Pourtales, Proc. Am. Ass. 1851, p. 13. From fish-stomachs.

SYRTENSIAN FAUNA.

The following species have been obtained from St. George's Bank and other deep-water banks off the coast of New England. that I regard as belonging to this fauna. Doubtless most of the Arctic species included in the previous fauna, will also be found with these, when the localities are more explored.

Polypi.

Rhodactinia (Tealia) Davisii Ag.

I have obtained a single large specimen from a bank several miles east of Grand Menan in about forty fathoms.

Metridium marginatum E. and H. (?)

Dr. Stimpson mentions a specimen. probably of this species, under "*Actinia dianthus?*" from the "Gravelly-bottom," a bank east of Grand Menan, probably near the same locality as the last.

Paragorgia arborea Edw. and H.

From the mouth of the Bay of Fundy in deep water, with the next.

Primnoa Reseda Verrill.

Primnoa lepadifera Lamx.

St. George's Bank (Essex Inst.); Mouth of Bay of Fundy (Portland N. H. Soc.); Mouth of Bay of Fundy, thirty miles southeast from Mt. Desert, Me. (Museum of this Society.)

Alcyonium rubiforme Dana. and also, apparently, another species have been found at the Banks of Newfoundland, both of which are likely to occur at St. George's Bank.

Echinodermata.

Ophiacantha spinulosa Müll. and Tr.

Bay of Fundy, off Grand Menan, sparingly in the Coralline Zone. Dr. Wm. Stimpson.

Ranges northward to Greenland and Spitzbergen, and to the northwest coast of Norway.

Pteraster militaris Müll. and Tr.

Off Grand Menan in thirty-five fathoms, shelly bottom. Dr. Wm. Stimpson. This locality belongs, perhaps, properly to the Syrtensian Fauna, like that of the next species.

This species is found at Greenland (Lütken), Spitzbergen, and on the northern coast of Europe, at Finmark, etc., in deep water.

Goniaster phrygianus Stimp. 1853.

Goniaster equestris Agassiz. *Astrogonium phrygianum* Müll. and Tr. *Asterias equestris* Gould, l. c. p. 344. *Hippasteria phrygiana* A. and E. C. Agassiz, op. cit. p. 113.

Off Duck Island, Bay of Fundy, in the Coralline Zone, Dr. Wm. Stimpson. An Arctic species, found also on the northern coast of Europe.

Ctenodiscus crispatus Dub. and Koren.

Off Grand Menan in fifty to sixty fathoms, muddy bottom, Dr. Wm. Stimpson.

Unless the "*Asterias aranciaca*" mentioned by Dr. Gould as taken from the mouth of a cod fish, was the young of this species, it may indicate the occurrence of a species of *Astropecten* in this region.

Crossaster (Solaster) **papposus** Müll. and Tr.

St. George's Bank in thirty-five to forty fathoms, Capt. N. E. Atwood; Banks of Newfoundland.

Solaster endeca Forbes.

St. George's Bank, in twenty-five fathoms, Capt. Atwood.

Asterias (Asteracanthion) **polaris** (M. and Tr. sp.)

A specimen obtained at St. George's Bank, in thirty-five or forty fathoms, by Capt. N. E. Atwood, belongs to the Collection of this Society. This is 10.5 inches in diameter, disk 1.75 broad, arms 0.8. wide at base. The dorsal surface is less evenly spinose than in ordinary Labrador specimens, there being scattered, long, cylindrical, obtuse spines, while the majority of the spines are quite small and less capitate than usual. The lateral and ventral spines, the pedicellariæ, and the form of the six rays agree well, however, with this species.

Thyonidium elongatum Ayres, these Proc., Vol. IV, p. 60, 1851.

St. George's Bank, thirty fathoms, Dr. Ayres. Is *T. musculosum* Ayres, distinct from this?

Thyonidium glabrum Ayres, op. cit. p. 69.

St. George's Bank, thirty fathoms, Dr. Ayres.

Anaperus unisemita Stimp. op. cit. p. 8.

Stereoderma unisemita Ayres, op. cit. p. 46.
Banks of Newfoundland, and probably off Massachusetts Bay.

The three preceding species require reëxamination and critical comparison with European species.

Pentacta frondosa Jæg. (?)

Bothryodactyla grandis Ayres, op. cit. p. 52.
St. George's Bank, thirty fathoms, Dr. Ayres.

Psolus regalis Verrill.

Psolus granulatus Ayres, op. cit. p. 63, (*non Grübe*, 1840).
Banks of Newfoundland, (Coll. Essex Inst.); St. George's Bank, in thirty fathoms, Dr. Ayres.
An examination of one of the original specimens of Ayres, in the Essex Institute, has convinced me that this species is distinct from *P. phantapus*, with European specimens of which I have compared it.

The following additional species, which have been found in Labrador, or at the Newfoundland Banks, may hereafter be found at St. George's Bank, etc.

Ophioglypha nodosa Lyman; *Astrophyton eucnemis* M. and Tr.; *Eupyrgus scaber* Lütken; collected by Dr. A. S. Packard, Jr., in 1860, in Southern Labrador.* *Amphiura Holbolli* Lütken; *Myriotrochus Rinkii* Stp.; *Asterias Grœnlandica*; collected by Dr. Packard in 1864, on the east coast of Labrador.

Asterias Grœnlandica Stp. sp. Dredged in fifteen fathoms in the Gulf of St. Lawrence, near Anticosti, by myself.

Ophioglypha Stuwitzii Lyman. Newfoundland Banks, Dr. Lütken.

Anaperus cigaro and *Orcula Barthii* described from Labrador by Troschel.

* A List of Animals dredged near Caribou Island, Labrador, by A. S. Packard, Jr., in Canadian Naturalist and Geologist, Dec., 1863. In that paper, by an unfortunate error of the printer, the word "feet" has been substituted for *fathoms* after the depth of each species.

On the Formation of the Excavated Lake Basins of New England. By N. S. Shaler.

No phenomena resulting from the action of the forces in operation during the Drift period are so enigmatical as the excavated lake basins found throughout nearly the whole of the regions to the north and south of the equator which present distinct evidences of glacial erosion. Wherever found, the similarity of form seems to evince the essential similarity of the forces involved in their production, and the striking contrast they afford to all the ordinary results of erosive action compels us to seek their origin in some cause or causes which affected only regions on which the glacial sheet was imposed.

There are in operation in the regions characterized by glacial lakes, no forces capable of producing such depressions; on the contrary all the forces at present in action tend to obliterate the existing basins. This fact needs to be borne in mind if we would comprehend the full extent of the facts, for over the surface of New England, and probably over all such lake countries, sedimentary accumulations and the formation of peat bogs have diminished the original area of the basins quite one half. A very large portion of them have lost the character of lakes, and thereby ceased to be conspicuous features in the landscape, so that it is only after careful examination of the structure of a region that the original extent and number of these peculiar basins can be clearly perceived. If we could expose the surface of the rock on which the glacial mass rested, throughout New England, we would probably find no considerable area which did not present basins referable to glacial erosion alone. Over the surface of Eastern Massachusetts, where the observations of the author have mostly been made, it is not easy to find a space of ten square miles which does not present unmistakable evidence of this local erosion. The occurrence of these basins over such wide spread areas, and their existence on surfaces at considerable distances from steep declivities, renders it highly improbable that they could have been produced by the local erosion which takes place where a glacier meets a comparatively plain surface after passing over a steep slope. This action, though competent to produce basin-like depressions, is manifestly insufficient to account for the majority of the cases. The theory which assigns irregular upheaval as the cause of these basins, is not applicable, since the contour of the basins and the structure of the rocks about them prove conclusively that in most cases they are due to excavating agents. Nor has it been shown why such abnormal elevatory actions are restricted within the subglacial area.

There are some facts connected with the distribution and form of glacial basins which have an important bearing on all theories of their origin. Although limited within the regions which have been covered by the glacial mass, these basins are not equally distributed over all portions of those areas. They are largest, deepest and most numerous in those portions where we have reasons for concluding that the glacial sheet was thickest, and diminish as we approach the southern boundary of the ice field. They are less conspicuous and cease to be noticeable before we reach the limits of the glacier as shown by scratched and polished surfaces. There seems to be some reason why the surface of a country underlaid by little disturbed sedimentary rocks should present a less favorable field for the formation of numerous basins, than where the underlying rock has been rendered varied in structure by irregular metamorphism and injected materials. Until, however, the precise character of most of our lakes is ascertained, and it is determined whether they are rock basins or only moraine lakes, it will not be possible to attach much importance to this point.

There are coincidences in the figure of these basins which have the highest value. Few, except the smallest, present any approximation to a circular figure, and in a general way the larger the area the greater the proportionate extent of the major axis. If we could accept the gradations in size as degrees of development, then it would seem likely that the force producing these basins acted in such a manner that, if originating in a circular depression, they necessarily became elongated and tended to develop the greater diameter more rapidly than the lesser. This feature has an additional value when we notice that the major axis of the basins has usually a north and south trend. There are very conspicuous exceptions to this law to be found outside of the surface of New England, but in them as well, there seems to be a general rule that, failing to follow the usual north and south direction, their major axes have a direction corresponding to that of the river system or valley in which they are situated. The most conspicuous lake basins which do not seem reconcilable with either of these divisions are those of Athabasca, Slave and Great Bear lakes, which, as will afterward appear, are explicable if we grant that the continental glacier had little or no southward movement in such high latitudes, but that the accumulation of ice found escape in an easterly direction.

In the great depth of these basins, compared with their other dimensions, we have a feature which needs to be borne in mind while seeking an explanation of their formation. Many of the smaller basins have the vertical bearing so great a proportion to the horizontal measurements as to put at once out of the question that theory which derives them from the ordinary irregular wearing at the base of a glacier. Great as this depth frequently is, it must be remembered that when the basins were formed it must have been far greater. If we assume the least time which can be reasonably assigned to the present epoch, and suppose the glacial condition to have passed from this hemisphere at least 100,000 years ago, and admit an average rate of deposition of sedimentary materials of only one-tenth of an inch per annum, we would have the depth of the cavities reduced over 800 feet. When we consider the extreme activity of all the forces tending to fill up the basins in the diluvial condition which must have ensued from the melting of the glacial sheet, it would seem that this estimate of one-tenth of an inch per annum is not excessively high, and when we call to mind the fact that one hundred thousand years is about the *minimum* of time which could have elapsed since the cessation of the glacial period, and that the true time is probably much greater, it will be evident that many of our still deep basins have had their depth diminished at least one thousand feet. To satisfy the facts it is necessary that theory should explain how, through the operation of forces brought into action by the imposition of the glacial sheet, these exceedingly deep excavations could have been formed.

It is evident that the origin of these depressions is to be sought in some cause producing local irregularities in the erosive action of the glacial sheet. We have already given reasons for concluding that, in most cases, this local increase in the wearing action could not be ascribed to the impinging of ice moving down steep slopes against the level surface at the base. It may be further objected that this action would not be competent to produce basins, but could only develop them still further, except where steep declivities already existed. Nor is it conceivable how such great depth, with a moderate length, could be attained through the operation of such a cause. The easiest method of comprehending the nature of the forces operating to abrade the surface at the base of the glacial sheet, is to conceive a gradual return to the conditions existing on the land surface within the drift area during that period. At first, as in our winter snows, the surface of the glacial sheet would correspond in a general way to the outline of the area on which it rested, only the smaller irregularities would be leveled over. As the thickness increased, the outline of the land would be less and less represented by the irregularities of the crust of the glacier, and finally, when the mass had come to have a depth of thousands of feet, only the most important reliefs would have any effect on the contour of the upper surface of the ice. The vertical thickness of the ice would be greatest over the valleys and less over the hills, in proportion as they rose above the general surface.

The importance of these differences in the depth of the glacial mass becomes apparent when we consider some other effects of the accumulation. Acting as a nonconductor, the glacial mass would prevent, to a great extent, the escape of heat which is constantly passing from the interior to the surface of the earth. Therefore the immediate result would be to bring the isogeothermal lines nearer the original surface. In the uncovered condition of the land the isogeothermal lines correspond in their curves with the principal irregularities of the surface rising beneath the ridges and curving downwards under the valleys. As soon, however, as the glacial matter had filled any considerable valley, the isogeothermal lines beneath would begin to become parallel to the new surface, ceasing to have the original conformity with the rock surface. Let further accumulation take place, and it is plain that in time the isogeothermal of the melting point of ice must invade the glacial mass. It is furthermore evident that the melting arising from this ascent of the lines of equal heat will take place first at the lowest points, as in the deeper river valleys, and would, over such basin regions as New England, be particularly active in the deep lake cavities. Beginning at the lowest points, and over small areas, the points where melting could take place would increase in number and the areas enlarge until the removal of the ice from this and other causes balanced the accumulation going on upon the upper surface of the glacier. In case the increase in thickness was gradual, it seems likely that the equilibrium between the deposition on the surface and the melting at the base of the glacier might be easily established. If, however, the accumulation was rapid it seems very likely that a very sudden melting of the base might occur, and several oscillations in the position of the isothermals take place before this equalization of the actions of deposition and melting was brought about.

In this local melting at the foot of the glacier it is believed we have the agent which has produced the local erosion we find in glacial basins. The melted water can not escape to the surface, as it would there be frozen and the mass in no way diminished. Besides this, the hydrostatic pressure would operate with great force to compel a lateral movement along the base of the glacier. The most probable means of escape would be over the lowest rim of the depression in which it was melted in the direction of lower levels. The existence of sub-glacial streams flowing in channels excavated in the ice in the continental glaciers of Greenland, renders it likely that this water would excavate a conduit in the direction of the drainage of the country, and that from the many melting points connecting, might arise a river system similar to that found in these regions when freed from the ice. Where, however, the glacial sheet thinned off in any direction, it is possible that the influence of pressure in determining the course of the streams might be greater than the influence exercised by gravitation, and that thereby the water might be forced across the surface in a direction differing widely from the course of the natural drainage.

The water, relieved from its rigid condition and forced out of the basin where it was produced, would necessarily have a certain effect in deepening the basin and in cutting out the lowest portion of the rim. In addition to this, the waste of the ice within the depression would necessarily be supplied by the subsidence of the ice immediately over the basin, and the sliding towards the centre of the ice on either side; these actions would be attended with wearing of the bottom and sides of the basin. If the thickness of the ice over the basin remained the same, we would have with the increase in depth of the cavity a constant augmentation in the intensity of the melting action. If the glacial mass had no general movement, then the result of these actions would be the formation of more or less circular depressions; if, however, the ice had motion in any direction, the result would be the elongation of the basin in the direction of that movement. This would arise from the preponderance of the erosion at those points where the glacial stream entered and emerged from the basin; if the movement was sufficiently rapid, the waste by melting might be sufficiently replaced by the material pushed into the basin by the general motion alone, and the flow of ice from either side and the lateral erosion arising therefrom destroyed. In this case, we would expect to find the development of the basins producing very much elongated and deep depressions, having their major axes corresponding to the course of the glacier. Much would necessarily depend upon the original contour of the basins, the trend of the vallies in which they were placed, and the nature of the materials in which the excavation went on. Notwithstanding all these obstacles in the way of a uniform result, it is easily seen on the surface of New England that some such laws in the formation of these basins exist, and this view of the operation of the forces at work beneath the glacier seems to be supported by the facts.

There remains the question as to the origin of the basins; a hypothesis to account for their development has been advanced, but no way shown in which they could originate. Something is without doubt to be attributed to the original irregularities of the rock surface produced by unequal elevatory actions, and it must be recollected that a few feet of depth might originate the actions which deepened the basin. But it seems likely that the cause is to be sought elsewhere, in actions which have received little attention from geologists, yet which are capable of producing very important results, viz., in the different conductive power to heat of the varied materials composing the earth's crust. This inequality of conductive power would cause the isogeothermal lines to rise with different rapidity at various points in the same region, and consequently the temperature capable of producing melting would attain the surface of places of different heights at the same time. Assuming a horizontal surface with varied conductive power, melting would, from this cause, have the same tendency to begin at some points much sooner than at others, as would arise from vertical inequalities. There being no regions absolutely level, and no considerable areas of the crust of the same conductive power to heat the points where melting would begin at the base of a glacial accumulation, it would be determined by both of these features together. The flow of heat from the interior during the latter geological epochs has been of such small amount that the rise of the isogeothermal lines would be necessarily very gradual. This would admit of a considerable excavation before the lines had passed through the materials of slower conductive power. so as to produce melting over the whole of the base of the ice. It is most probable that on our hypothetical plain, melting would never take place over the whole surface, but that the local melting would more than equal the accumulation, long before any considerable portion of the surface had been elevated above the melting point. The diversity in the rate of increase of temperature as we descend in different parts of the crust, is sufficient evidence of the varying conductive power. It could be shown by a discussion of the circumstances attendant on these variations, that it is eminently probable that veins of injection conduct with much more facility than stratified materials, a conclusion which harmonizes with the most familiar laws of conduction.

It is not improbable that the extremely varied conductive power of the earth's crust within New England, may be the main reason for the great number of the glacial basins in that region.

The effect of this melting of the glacial base from the heat received from below, on the excavation of river valleys and the transportation of drift materials, afford interesting questions, but which it is not possible to discuss in the present state of our knowledge of the facts.

These views are not presented by the author as altogether satisfactory explanations of the facts. nor is it to be supposed that these notes are meant to present anything like a discussion of the hypotheses brought forward. We have unfortunately far too little accurate information on the subject to warrant such an attempt. It is hoped however, that they may contain suggestions which will afford the basis of profitable investigation by geologists and physicists. It may be remarked that some of the greatest objections which could be urged to the views herein presented, are lessened in value when we recollect that all the glacial erosion visible in drift regions can not properly be attributed to the glaciation from which the hemisphere has just emerged. It is more than probable that these lake basins have again and again been filled with glacial ice, and the seat of the erosive actions we have tried to trace, and that the face of the land is the record of the wearing of many glacial periods, complicated and modified by the ordinary sub-aerial erosion.

As an instance of the agency of man in modifying the geographical distribution of animals, Prof. Verrill said that he had been informed by a missionary that, in the Pacific Ocean, the natives were accustomed to transplant a species of living coral, (*Montipora*), hundreds of miles in their canoes, from one island to another. Mr. H. Mann confirmed this statement, saying that this coral was used by those natives for scouring the bottoms of their canoes.

Dr. H. Bryant presented the upper portion of a skull from a cave which must have been used as a place of burial, on Moneague Island, one of the Bahama group. Among the remains of ten or twelve skeletons, there were no complete skulls. This calvarium was greatly flattened, probably artificially, and not symmetrical, as the left parietal bone was more prominent than the other. With these bones had been found, by another gentleman, native tools and a stone hatchet.

Messrs. R. C. Greenleaf, C. J. Sprague, and Dr. J. B. S. Jackson were appointed a committee to nominate officers to be balloted for at the next annual meeting.

The Chair appointed Mr. C. J. Sprague and Dr. C. E. Ware a committee to audit the accounts of the Treasurer, and to report at the next meeting.

May 2, 1866.

ANNUAL MEETING.

The President in the chair.

Forty-two members present.

The Acting Custodian made the following Report, embodying the Annual Reports of the Acting Librarian and the Curators of the Museum for 1865–6.

There have been twenty stated meetings of the Society, and eight meetings of the Microscopic Section. The average attendance of the meetings of the general Society has been thirty-four members, and of the Microscopic Section, nine members.

At these meetings, thirty-six communications have been presented, as follows:

May 17, 1865.

CHARLES A. WHITE, M. D. Observations on the genus *Belemnocrinus*.

June 21, 1865.

Capt. N. E. ATWOOD. On the habits of the Halibut.

July 5, 1865.

A. A. GOULD, M. D. The Nudibranchiate Mollusks of New England.

September 20, 1865.

Prof. J. WYMAN. On the formation of Ripple Marks.

S. H. SCUDDER. Notes upon some *Odonata* from the Isle of Pines.

October 4, 1865.

B. G. WILDER, M. D. On the *Nephila plumipes Koch?* its habits, and a new method of obtaining its silk.

S. H. SCUDDER. Notes on some White Mountain *Odonata*.

A. S. PACKARD, JR., M. D. Observations on the Drift Phenomena of Labrador and Maine.

October 18, 1865.

A. AGASSIZ. On the Development of the *Porcellanidæ*.

B. G. WILDER, M. D. On an imperforate ear in a Negro.

Prof. H. J. CLARK. The Anatomy and Physiology of the Vorticellidan Parasite (*Trichodina pediculus* Ehr.) of Hydra.

November 1, 1865.

C. T. JACKSON, M. D. Account of a Journey to California and Nevada.

H. MANN. On the recent Eruptions of Kilauea and Mauna Loa.

November 15, 1865.

Prof. H. J. CLARK. On the Vestibular Lash of one of the *Vorticellidæ*.

H. Mann. On the Denudation observed in the Hawaiian Islands.

Prof. J. Wyman. Accounts of some irregularities noticeable in the cells of the Hive Bee.

December 6, 1865.

Prof. W. P. Blake. Notice of an earthquake occurring at San Francisco, Cal., and vicinity, Oct. 8th, 1865.

A. Agassiz. On the Development of *Limulus*.

N. S. Shaler. Preliminary Notice of some opinions concerning the mode of Elevation of Continental Masses.

F. W. Putnam. On the Ichthyological Fauna of the Great Lakes of America.

December 20, 1865.

Prof. H. D. Rogers. On the Pleistocene Climate of Europe.

January 3, 1866.

H. Bryant, M. D. A List of Birds from Porto Rico presented to the Smithsonian Institution by Messrs. Robert Swift and George Latimer, with descriptions of new species or varieties.

Prof. A. E. Verrill. On the distribution of Birds in the United States, with reference to the physical causes that determine their limits in latitude.

On a new preservative fluid, and on the morphology of the eye of insects.

J. C. White, M. D. Description of two Crania from California.

Rev. S. Weiz. A list of the Vertebrates of Labrador; with annotations by A. S. Packard, Jr., M. D.

February 7, 1866.

A. S. Packard, Jr., M. D. Observations on the development and position of the *Hymenoptera*, with notes on the Morphology of Insects.

February 21, 1866.

N. S. Shaler. On the modification of Ocean Currents in successive geological periods. Part First.

A. Hyatt. On the Morphology of the Shell of Mollusca.

March 7, 1866.

Prof. W. Denton. On a new Bitumen from rocks of probable miocene age in Utah.

A. A. Hayes, M. D. Description and Analysis of a new kind of Bitumen.

April 4, 1866.

H. Mann. Description of some new species of the genus *Schiedea*, and of a new allied genus.

Revision of the Rutaceæ of the Hawaiian Islands.

C. T. Jackson, M. D. Chemical analyses of minerals associated with the Emery of Chester, Mass.

Capt. N. E. Atwood. On the habits of the Haddock.

April 18, 1866.

Prof. A. E. Verrill. A Review of the Polyps and Corals of Panama and vicinity, with descriptions of eleven new species of Corals.

On the Polyps and Echinoderms of Long Island Sound, with descriptions of two new species of a new genus.

During the year the Society has elected eleven Corresponding Members and forty-four Resident Members.

The Society having again resumed publication, the first Part of Volume I. of the Memoirs, is now ready for distribution, and nearly one half of Volume X. of the Proceedings, including the records of the meetings held during 1864 and 1865, have been printed, and issued. There are now two hundred subscribers to the Proceedings, and one hundred and seventy-four to the Memoirs. Still more, at least one hundred, are needed to make these journals self-sustaining.

It will be seen by the reports of the Librarian and several Curators, that the additions this year have, in certain departments, been of much importance, while the total number of specimens presented, amounts to 14,000. The collection of birds, especially, has been increased to three times its former size, while its real value has been enhanced in a much greater proportion, by the liberality of the Curator of Ornithology in presenting to the Society a series of birds which formed the largest private collection in Europe. By the addition of this most extensive collection, which was made by Count Lafresnaye, an accomplished ornithologist, and which comprises nearly nine thousand specimens of mounted birds, the Society's Collection has now become one of national importance, and invaluable for reference to our working ornithologists.

In order to suitably arrange this immense collection, the two west rooms on the third story have been fitted up for their reception under the superintendence of a committee, consisting of Drs. J. C. White and H. Bryant. An entirely new arrangement of this department is to be made, as the previous collection is to be merged with that of Lafresnaye. All the birds are to be removed from the eastern end of the gallery, where they are at present, and the space thus made vacant by opening the new rooms, will be taken up by the collection of fishes to be removed from the gallery above. This arrangement will be soon completed, when the galleries, now temporarily closed to the public, will be reöpened. For several months past, two taxidermists have been employed upon the collection.

The Acting Librarian presents the following summary of additions by volume, parts of volumes and pamphlets, stating that of the number of books now in the library—there are 7,622 volumes, 2,097 parts of volumes, and 2,462 pamphlets:

	8vo.			4to.			folio.			
	vls	pts	ph	vls	pts	ph	vls	pts	ph	To'l
Books presented by individuals	36	5	75	9	4	5		2		136
" purchased	13	26		7						46
" deposited by the Republican Institution	32									32
" received in exchange for our publications	141	291	45	121	52	4	1	112		767
Total .										981

In answer to the special requests sent out a year ago to the Societies in Europe with whom we are in exchange, for the back volumes of their publications wanting in our series, and also by the renewed application, both in person and by letter, of the Librarian, a most valuable series has already been received. Other important Societies promise to transmit additional series of desiderata.

All these parcels have been transmitted through the Smithsonian Institution at Washington, to which the Society is specially indebted for this unusual tax on its resources.

In response to a circular letter sent out through the medium of the Smithsonian Institution early in the year, and also to letters recently written, both in French and German, and sent out from Paris and Berlin through the agents of the Smithsonian Institution in those cities, by the Secretary while abroad, the following Societies, being twenty-nine in addition to those in the previous annual list, have entered into a permanent exchange of publications, some of which have already been received and placed on the shelves.

Geological Magazine	London.
Entomological Society of New South Wales	Melbourne.
Reale Istituto Tecnico di Palermo	Palermo.
Société de Biologie	Paris.
Société des Sciences Physiques et Naturelles du Département d'Ille et-Vilaine	Rennes.
Civico Museo Ferdinando Massimiliano in Trieste	Trieste.
Historischer Verein in Mittelfranken	Anspach.
Cercle Artistique, Littéraire et Scientifique d'Anvers	Anvers.
Société Académique d'Archéologie, Sciences et Arts du Département de l'Oise	Beauvais.
Massachusetts Agricultural Department	Boston.
Museo Publico de Buenos Aires	Buenos Aires.
Buffalo Society of Natural Science	Buffalo.
Chicago Academy of Sciences	Chicago.
Videnskabs Selskab i Christiania	Christiania.
Société d'Histoire Naturelle de Colmar	Colmar.
Gesellschaft für Erdkunde	Dresden.
Botanical Society	Edinburgh.
Royal Physical Society	"
Society of Antiquaries of Scotland	"
Institut National Genevois	Genève.
Versammlung Deutscher Naturforscher und Ärzte	Germany.
Glasgow Philosophical Society	Glasgow.
Repertorio Fisico-Natural de la Isla de Cuba	Habana.
Botanical Society of Canada	Kingston, C. W.
Derby Museum	Liverpool.
Geological Society	"
Historic Society of Lancashire and Cheshire	"
Anthropological Society	London.
Ethnological Journal	"

Good progress has been made in cataloguing the pamphlets, though they have not yet been placed upon the shelves. There is an urgent necessity for having an alcove catalogue made, especially felt when the annual account of stock is taken, so as to ascertain what books, if any, are missing. During the past year, Freycinet's Voyage round the World, and No. 12 of the Natural History Review have been taken from the room and not returned.

By the will of Huntington F. Wolcott, one of the younger members of the Society, the Library has now a fund of $5000 for its increase, and his name has been placed over one of the alcoves in acknowledgment of this liberal bequest.

The Council have voted $100 (gold) for the purchase of volumes wanted to fill up vacancies in the foreign serials, and since have authorized the Librarian, while abroad, to purchase books to the amount of $200.

The number of persons who have taken out books during the year is 70; the number of books taken out is 432.

The Curator of Geology and Palæontology reports the condition of the cabinet under his charge to be good, the specimens being mostly labelled, and well arranged for display and study. It has been increased the past year by donations from many parties, some of which are of great value. Among these may be particularly designated that of the large cast of the *Schistopleurum typus* from the Pampean deposits of South America, by Mr. Martin Brimmer; and of a large collection of Fossils, mostly from the upper Missouri, by the Smithsonian Institution.

To Dr. C. F. Winslow, Mr. T. G. Bancroft, Dr. C. T. Jackson, Dr. H. Bryant, Dr. J. F. Frisbie, Dr. A. S. Packard, Jr., Dr. George Rolleston, Mr. W. C. Russell, and Mr. George G. Varney, the collection is likewise indebted for many interesting specimens.

The Curator of Microscopy reports that the Bailey and other collections under his care, are now in good preservation, but have not as yet been put in such order as their importance demands.

Quite a number of mounted specimens and rough material for the same have been presented through the Microscopic Section during the past year, by Dr. S. A. Bemis, Messrs. C. G. Bush, J. S. Melvin, and Dr. C. F. Winslow. The meetings of the Section have been well attended, and additional interest in both it and the general Society thereby excited.

The additions to the Ethnological collection made during the past year, are:

Bow and arrows, evidently Californian, (from perhaps the region of Shasta Mountain). Presented by Dr. H. Bryant.

Stone axe, made by aboriginals of Eastern North America. Presented by A. E. L. Dillaway.

Grass mat, manufactured by, and the costume of, the women in West Africa; also hasheesh or hemp cigars, in use there. Presented by Horace McMurtrie.

The following additions have been made to the department of Comparative Anatomy during the past year.

Skeletons 3; Parts of skeletons 10; Skulls 20; Skins of mammals 4; Mammals in spirit 5; miscellaneous 3: total 44.

Among the most valuable of these are two complete skeletons, and several skulls of natives of the Sandwich Islands, brought from Honolulu by Mr. H. Mann. One of these skeletons has been mounted and placed in the Anthropological case. Dr. C. T. Jackson has also presented a valuable human cranium from California. Additions have also been received from Drs. A. A. Gould, A. S. Packard, Jr., H. Bryant, B. J. Jeffries, C. A. Kirkpatrick, J. K. Warren, S. Kneeland, and the Boston Milling and Manufacturing Company.

The specimens belonging to the department, with the exception of the skins, are in good order.

The Curator of Ornithology states that the original collection is in the same good order as reported last year.

Late in the last autumn, the Lafresnaye collection of birds presented by the Curator, arrived from France. This fine collection, numbering 8,656 specimens, arrived in very perfect condition, as the Curator while in France, personally superintended the packing of the specimens. The collection formed by Count Lafresnaye, one of the most eminent ornithologists in France, is of great value as containing the type specimens of over seven hundred species, most of them American, and largely representing the bird fauna of tropical America, and therefore of special interest to local ornithologists in this country, as affording them great facilities for the examination of the rarer types, besides being of great importance as a general collection.

Many of the species were identified by M. Jules Verreaux, who also catalogued the entire collection, and who is doubtless the most conversant of living ornithologists with the species of birds in general.

The Curator would mention particularly the services of Dr. J. C. White in rearranging the collection, who specially deserves the thanks of the Society.

The department of Oölogy remains in the same condition as last year. There have been no additions.

The collection comprises the eggs of two hundred and thirty-five species of birds, exclusive of eggs not identified. They have been rearranged by Mr. B. P. Mann, according to Baird's Catalogue for the North American species.

The Curator of Herpetology reports that since the department came under his charge, the Reptiles have been put into a safe condition, until proper jars and alcohol shall be furnished for the exhibition of the remainder of the collection.

The additions to the department during the year number sixty-nine, and have been received from the following gentlemen: Drs. A. S. Packard, Jr., S. Kneeland, and C. F. Winslow, Messrs. S. Hinckley and Florence Andernach, D. White and Capt. Barber.

During nearly the whole year, one day per week has been devoted by the Curator of Ichthyology to the collection under his charge. The alcoholic specimens, with a very few exceptions, are now catalogued; each species and locality being entered under a distinct number. A large portion of the species have been identified.

With the exception of labelling the few hundred specimens on exhibition, little work can be done on the collection until the much needed jars and alcohol are provided.

The large collection of fishes from the Sandwich Islands, presented by Dr. C. F. Winslow, nearly six years since; the valuable collection of Cuban fishes, procured from Prof. Poey, with his identifications, three years ago; the collection of North American fishes, presented by the Smithsonian Institution during the past year; and those made by the Curator during the last two years, at Lake Erie and several of the lakes in Maine, still remain in cans and kegs for the want of jars.

For some time past it has been the wish of the Curator to place on exhibition a complete series of the fishes of New England, for which purpose he has paid special attention to the collection of specimens in various parts of New England, and if jars and alcohol were now at his command, a very fair exhibition of the New England Ichthyological fauna could be made, which, in a few years, could be perfected, though it would be necessary to represent the larger fishes, especially the sharks and skates, by stuffed specimens.

Is there not some member of the Society who would be willing to provide the means of placing such a special and valuable collection, which could be called after his name, in our cases?

The principal receipts during the year have been: 1st, the collection of fifty-four species of North American fishes, identified by Prof. Gill, and presented by the Smithsonian Institution; 2d, the collection of ten species and about one hundred specimens of Labrador fishes, presented by Dr. A. S. Packard, Jr.; 3d, a collection of about forty species and one thousand specimens, made by the Curator in October last, at Kelley's Island, Lake Erie.

Besides the above mentioned collections, about twenty specimens have been received from Dr. B. S. Shaw, Messrs. C. J. Sprague, W. H. Dall, J. S. Lewis, Samuel Hubbard and R. C. Greenleaf. Mr. Caleb Cooke of Salem, has presented a fine specimen of the rare *Leptocephalus gracilis* Storer, one of six which he collected on Nahant beach in July, 1858.

The Acting Custodian reports, in the absence of the Curator of Entomology for a portion of the year, that good progress has been made in naming and arranging the insects. Many of the moths, comprising the families Zygænidæ, Bombycidæ, and Phalænidæ, have been most neatly labelled and arranged in boxes by Mr. F. G. Sanborn, who has devoted much time during the past winter to this work. Several families of the Hymenoptera have been labelled by Dr. Packard, and many of the Ichneumonidæ by Mr. E. T. Cresson, Curator of the Entomological Society of Philadelphia, to whom the duplicates of the collection have been entrusted for that purpose. The MSS. names bestowed on numerous species by Dr. Harris, have been thus in many cases retained and credited to him. Mr. E. Norton has returned labelled, several additional species of Tenthredidæ, and also a small collection of Ichneumonidæ loaned from the collection.

The alcoholic collection has been put in safety, and the boxes containing dry specimens placed out of danger from the ravages of insects by being deposited in a large tight case, exposed to the strongest fumes of benzine.

There have been added over six hundred specimens, of which the principal donors are Drs. H. Bryant, S. A. Bemis, C. F. Hildreth, A. A. Gould, C. T. Jackson, S. Kneeland, Jr., C. F. Winslow, Messrs. A. R. Grote, Samuel Hubbard, S. H. Scudder and Prof. J. L. Smith.

The collection of Crustacea has been increased by four hundred and forty specimens. Of these fifty species, comprising about three hundred and forty specimens, represent the crustacean fauna of Labrador; and twenty-five species, eighty specimens, that of Maine. The donors are Drs. B. S. Shaw, A. A. Gould, A. S. Packard, Jr., and Messrs. E. R. Mayo, Samuel Hubbard, C. Stodder, and Capt. E. Smith.

The Department of Worms having been united with that of Crustacea, they have been rearranged, placed in new bottles, and are about to be catalogued. The entire collection consists of fifty-five species, comprising thirty species, one hundred and fifteen specimens, from the coast of Labrador; and fourteen species, sixty-five specimens, from Maine, obtained by the Curator. The donors this year are Messrs. F. G. Sanborn, C. C. Sheafe and Dr. A. S. Packard, Jr.

The Department of Conchology remains in much the same state as at the last annual report. The Gasteropods alone are on exhibition, arranged in the rail cases of the first gallery. These form rather less than one third of the whole number of specimens in the possession of the Society, and it is to be regretted that no steps have yet been taken to furnish a room for the display of the remainder of the collection. The Curator again desires to call attention to the paucity of alcoholic specimens. It is very desirable that members of the Society should fill this blank. The commonest species of Mollusca preserved in spirit would be acceptable, even from the immediate neighborhood of Boston. The additions received during the past year, although not numerous, are very valuable; among them may be especially mentioned fifty-four species, described by C. B. Adams, from Panama; eighty-nine species, P. P. Carpenter's types, from Vancouver's Island and California; series of P. P. Carpenter's types of Mazatlan shells; series of land, fresh-water and marine shells, named from Dr. Gould's types, and the Cuming Collection, obtained by the U. S. Exploring Expedition under Commodore Wilkes; upwards of one hundred and fifteen species of Mollusca, mostly alcoholic, from the coast of Labrador, from Dr. A. S. Packard, Jr; a series of Cuban shells, named and presented by Dr. Gundlach; series of British Mollusca, from Dr. H. Bryant, twenty-two species of Achatinella from the Sandwich Islands, presented by Dr. A. Chapin. Beside these we have also received donations from Drs. C. T. Jackson and A. Coolidge, amounting in all to about fifteen hundred specimens.

The arrangement of the collection of Radiata during the past year has been greatly advanced, but the work has been done more with reference to securing their permanent value, than to exhibit them. When the collection was placed under the charge of the present Curator, a very large part of the specimens of corals had no labels connected with them, to indicate their localities, or donors, and the few labels that had been formerly placed upon them loosely, were mostly lost, or misplaced, during the packing up and two successive removals of the collection. The same was true, to a considerable extent, of the collection of Echinoderms, both dry and alcoholic. The first object, therefore, was to trace the origin of as many of the specimens as possible, and not only identify the species, but to endeavor to ascertain their localities, and render such accidents in the future impossible, by attaching securely to each specimen a number corresponding to that of the label, and to a systematic catalogue. Many localities have been found by searching the records and Proceedings of the Society, and others by direct comparison with authentic specimens from other collections. Particular attention has been paid to identifying the types of new species described from the Society's specimens by Mr. Desor, Mr. Girard, and others. Many of these original specimens have been found without labels, but others, and especially the types of the Echini, described by Girard, have not been found. Possibly these have been lent to some other institution by some former Curator and not yet returned. The alcoholic collection of Echinoderms, which is a valuable one, has not been arranged for want of alcohol and bottles, but the specimens have all been put into a condition of safety, and a part of them have been catalogued. The collection of dried Echinoderms have all been catalogued and arranged upon the shelves, and nearly all of them authentically identified. This collection is quite large and valuable, but is still quite deficient in star-fishes and Ophiurans. The corals have been mostly identified, and partially catalogued, and all of them placed on the shelves of the gallery. Their systematic arrangement has been deferred until the cases destined for them are made ready by the new arrangement of the birds. The final labels have not yet been written, this having been deferred as of less importance, until the cataloguing is completed. The following additions have been received; from the Essex Institute, ten specimens, ten species, East India corals; from Dr. A. S. Packard, Jr., two hundred and fifty specimens, forty species, mostly from Labrador; from N. Appleton, six specimens, three species, corals; from the Museum of Yale College, ten specimens, five species, Echinoderms of United States; and forty-nine specimens, twenty-nine species, corals and Echinoderms, mostly from Panama, all of which are new to the collection. There have been sent away in exchange, to Yale College, forty-five specimens, thirty-two species.

The Curator of Botany reports that the Herbarium and other Botanical collections came into his hands and under his care last August, upon his return home, and were then, owing to the excellent care of his predecessor, in very good condition, but were still necessarily loose in folds of thin paper, in which condition they were in danger of being soon ground to powder if much handled, and of having the labels, often as important a part of the specimen as the dried plant itself, lost or misplaced. The larger part of the collection was arranged according to the classification of Endlicher's "Genera Plantarum," which had the very great advantage of rendering any plant easy of access by the current number of the Genus upon the cover. Since the publication of Endlicher's "Genera Plantarum," however, the acquisitions to botanical science have been so large as to render a somewhat revised arrangement necessary, and as that is to be found nowhere better than in the new "Genera Plantarum" of Bentham and Hooker, that work has been adopted as the standard by which to arrange the collection, and it has been rearranged in accordance with it as far as the work now goes.

As it is unsafe to allow Herbarium specimens to be much handled until they are securely glued to stiff paper, and as the view has been to render the Herbarium accessible and useful as far possible, a good deal of attention has been paid to having them so glued, and about fifteen thousand specimens have undergone such treatment during the winter. Other necessary work towards the lasting arrangement and preservation of the collection has been done, so far as time permitted.

It is hoped that the work, such as is mentioned above, is about half done. The necessary expenditures for assistance, paper, etc., have been less than three hundred dollars ($300) so far, and another two hundred dollars will perhaps suffice to finish the work. The amount is larger than was at first estimated, but the difficulty of forming a judgment beforehand is considerable.

In regard to the accessions during the past year, a list of which is given below, the only one of much importance is the Musci Exsiccati Boreali-Americani of W. S. Sullivant and Leo Lesquereux, containing three hundred and fifty-five species, and the Lichenes Americanæ Septentrionales, curante E. Tuckerman, fasciculæ 1–6, containing over one hundred species, besides numerous other species from different localities of both Mosses and Lichens, presented by our former Curator C. J. Sprague, Esq., to whom the Herbarium already owed so much in the very valuable series of Fungi which it now possesses. These accessions have made the Cryptogamic collection equal in value with the rest of the Herbarium, and give a fair illustration of those plants which are found in the United States.

Specimens have also been presented by Drs. J. S. Bemis, C. Pickering, C. F. Winslow, A. S. Packard, Jr., S. Kneeland, Jr., and Messrs. Gunning, E. R. Mayo, H. M. McIntire, William Nelson, and S. Wells, Jr.

The Curator of Mineralogy reports that he has been engaged during all the time that he could devote to this department, in cleaning and in placing upon the shelves, such specimens as were considered worth adding to the collection. The whole number of specimens belonging to the Society, now on exhibition, is about two thousand, and there are besides a large number that will be serviceable for exchange.

Of the whole number, a considerable portion have become the property of the Society through the liberality of Dr. Charles T. Jackson, and such portion would have been much greater than it is, if it had not been for the destruction of a large number of specimens in the damp cellar of our former building in Mason Street, where they were unfortunately stored for many years.

Dr. Jackson has continued to manifest his interest by presenting from time to time during the year past, valuable minerals brought by him from various localities, and the collection is also indebted to the Agassiz Natural History Society, to Dr. W. H. Dale, Dr. Henry Bryant, Dr. A. S. Packard, Jr., G. P. Huntington, Prof. Jeffries Wyman and others for interesting specimens.

REPORT OF THE TREASURER

ON THE

FINANCIAL AFFAIRS OF THE SOCIETY.

For the year ending May 1, 1866.

The Receipts and Expenditures for the year have been as follows:

Receipts.		
Dividend on Stocks		$5,932.00
Admission Fees		150.00
Annual Assessments		1,140.00
Courtis Fund Income		180.00
Walker Fund "		1,233.15
Bulfinch St. Estate Income		1,029.26
Life Membership		100.00
H. F. Wolcott Fund Income		140.50
Loan of Globe Bank		5,000.00
Total		$14,904.91
Expenditures.		
New Building and Grounds	$456.85	
Alterations for Department of Ornithology	5,030.61	
Furniture for New Building	60.84	
Cabinet	1,169.26	
Library	323.10	
Journal and Proceedings	1,050.33	
Repairs of New Building	612.81	
Salaries, wages, etc.	2,023.30	
Insurance (principally for five years)	752.50	
Fuel	371.55	
Gas	126.24	
Water Rates	35.00	
Sundry Expenses	670.21	
Interest	102.50	$12,795.10
Excess of Receipts over Expenditures		$2,109.81

The following is a Statement of the property of the Society, exclusive of the Cabinet and Library:

New Building.		
Building and Grounds, at cost	$99,881.26	
Furniture	10,155.89	$110,037.15
Bulfinch St. Estate.		
House in Bulfinch Street		25,000.00
Courtis Fund.		
Note Receivable secured by mortgage		3,000.00
Walker Fund.		
Notes Receivable secured by mortgage	$41,105.00	
Cash in the hands of Trustees	1,380.10	42,485.10
H. F. Wolcott Fund.		
$5000 U. S. Treasury 7.30 Notes		5,000.00
W. J. Walker Bequest.		
17 Shares Bates Manufacturing Co.	$2,720.00	
35 " Everett Mills	5.250.00	
30 " Hamilton Woollen Co.	9,000.00	
1 " Lawrence M. Co.	820.00	
80 " Washington Mills	12.480.00	
12 " Cocheco M. Co.	8,400.00	
2 " Lowell M. Co.	1,710.00	
4 " Laconia M. Co.	4,800.00	
3 " Pepperell M. Co.	3,225.00	
25 " Essex Co.	2,325.00	
300 " Old Colony and Newport R. Co.	31,500.00	
110 " Vermont and Canada R. Co.	10,560.00	
3 " Cape Cod R. Co.	195.00	
11 " Neptune Ins. Co.	2,200.00	
18 " Boston Ins. Co.	2,340.00	97,525.00
Miscellaneous.		
Cash in hands of Treasurer	$1,703.26	
Unsettled Accounts	37.92	1,741.18
Total		$284,788.43
Deduct Indebtedness.		5,004.00
Net value of Property		$279,784.43
Value of Property as estimated May 1, 1865 . . .		176,881.51
Increase		$102,902.92

The Stocks derived from the munificent bequest of Dr. W. J. Walker, did not come into the possession of the Society until December 5, 1865; and the income therefrom has all accrued during the five months that have since elapsed. We should not be warranted, however, in anticipating a continuance of such liberal dividends, especially on the manufacturing stocks.

In consequence of a legal difficulty, which has arisen in the course of the settlement of the Walker estate, a large portion of the property remains in the hands of the executors for distribution at a future, perhaps, a distant period of time. When this difficulty is disposed of, this Society, as well as the other institutions which are entitled to the residue of the estate, will receive a large addition to their resources. Under these circumstances, no reliable estimate can be made of the income of the Society for the ensuing year.

In regard to the necessary expenses of the Society for the next year, those of the present, may, perhaps, serve as a guide, though a very uncertain one; as its expenditures hereafter will probably keep even pace with its greatly increased means of usefulness.

DR. THOS. T. BOUVÉ, CHARLES J. SPRAGUE, AND EDWARD PICKERING, TREAS., TRUSTEES, CR.
IN ACCOUNT WITH THE INCOME FROM THE WALKER FUND.

1865. April 30.	To Cash balance on hand at date . . .	$146.95	1866. April 7.	By Cash paid and transferred to Edward Pickering, Treasurer of the Society, one half of the full income from this Trust during the year	$1,233.15
Sept. 1.	" received on Note of P. Hubbell & J. A. Turner for $25,000, six months interest to date . .	750.00	April 30.	" balance to new account to date .	1,380.10
Oct. 6.	" received six months' interest on Note of W. & E. B. Mountford for $16,105 to October 7th .	483.15			$2,613.25
1866. March 6.	" received six months' interest on Note of P. Hubbell & J. A. Turner to 1st inst.	750.00			
April 9.	" received six months' interest on Note of W. & E. B. Mountford for $16,105 to April 7th . .	483.15			
		$2,613.25			

Errors Excepted.

Boston, April 30, 1866.

DR. THOS. T. BOUVÉ, CHARLES J. SPRAGUE, AND EDWARD PICKERING, TREAS., TRUSTEES, CR.

IN ACCOUNT WITH THE BULFINCH STREET ESTATE.

Date	Dr.	Amount	Date	Cr.	Amount
1865. April 30.	To Cash balance on hand date brought from old account	$731.61	1865. May 9.	By Cash paid D. Tillson & Son for repairing roof	$8.01
Dec. 30.	" received of Mrs. Clarke, for six months' rent of house from Oct. last . . . . $500 less interest allowed . . 15	485.00	June 10.	" paid T. T. Litchfield for work on drains and cesspool . . .	21.34
			Dec. 30.	" paid tax on house . . . $316 less received of Mrs. Clarke 158	158.00
			1866. April 6.	" paid to Edward Pickering, Treasurer of the Society, balance of the amount on hand date towards settlement of bills for work on cases, etc.	1,029.26
		$1,216.61			$1,216.61

Errors Excepted.

Boston, April 30, 1866.

Dr. THOS. T. BOUVÉ, CHARLES J. SPRAGUE, AND EDWARD PICKERING, TREAS., TRUSTEES, Cr.

IN ACCOUNT WITH THE INCOME OF THE COURTIS FUND.

1866. April 12.	To Cash received of Warren Street Chapel, interest one year on mortgage note of $3,000 to Nov. 1st, 1865	$180.00	1866. April 12.	By Cash paid to Edward Pickering, Treasurer, amount received from Warren Street Chapel . . .	$180.00

Errors Excepted.

Boston, April 30, 1866.

The report of the Nominating Committee was made, accepted, and the following officers of the Society for 1866–7, ballotted for, and declared to have been duly elected.

The Committee asked that further time be allowed for the appointment of a Custodian.

PRESIDENT,
JEFFRIES WYMAN, M.D.

VICE-PRESIDENTS,
CHARLES T. JACKSON, M.D., AUGUSTUS A. GOULD, M.D.

CORRESPONDING SECRETARY,
SAMUEL L. ABBOT, M.D.

RECORDING SECRETARY,
SAMUEL H. SCUDDER.

TREASURER,
EDWARD PICKERING.

LIBRARIAN,
SAMUEL H. SCUDDER.

CUSTODIAN,

CURATORS,

THOMAS T. BOUVÉ,	Of Geology and Paleontology.
THOMAS M. BREWER, M.D.,	Oölogy.
HENRY BRYANT, M.D.,	Ornithology.
FRED. W. PUTNAM,	Ichthyology.
JAMES C. WHITE, M.D.,	Mammalogy and Comp. Anatomy.
SAMUEL H. SCUDDER,	Entomology.
B. JOY JEFFRIES, M.D.,	Microscopy.
CHARLES PICKERING, M.D.,	Ethnology.
ALPHEUS HYATT,	Conchology.
A. S. PACKARD, JR., M.D.,	Crustacea.
A. E. VERRILL,	Radiata.
THOMAS T. BOUVÉ,	Mineralogy.
HORACE MANN,	Botany.
BURT G. WILDER, M. D.,	Herpetology.

Dr. J. C. White announced the donation, by the Curator of Ornithology, Dr. Henry Bryant, of nearly nine thousand specimens of birds. This magnificent collection, one of the largest in Europe, was formed by Baron Lafresnaye, one of the most eminent French ornithologists in the city of Falaise, in Normandy, France. It was purchased by the donor while abroad, packed under his personal superintendence, and sent to the Society late in the last autumn.

On motion of Mr. Sprague, a committee, consisting of Messrs. C. J. Sprague, J. C. White, and T. T. Bouvé, was appointed to convey to Dr. Bryant the special thanks of the

Society, and express its warm gratitude for his most liberal donation.

On motion of Mr. Bouvé, the thanks of the Society were given to Dr. J. C. White for his constant care and interest manifested in arranging this large collection.

Prof. A. E. Verrill exhibited specimens of ores from the metalliferous region of Northern New Hampshire, among them quartz containing a large amount of copper pyrites, with a little native copper and mispickel from Franconia, which, with the beds of magnetic iron ore at this locality, occurred conformably with nearly vertical strata of hornblendic and micaceous schists, which at the summit of the iron ore hill formed an anticlinal axis. At a locality about a mile from Lisbon, a vein four or five feet thick has been opened, and is stated by the agent to yield $60 per ton in practical working. Several specimens containing visible gold, were exhibited from this place. At Moulton Hill, five miles from Lisbon, N. H., an auriferous quartz vein occurred in connection with similar metamorphic rocks as were found at Lisbon. On the surface of this quartz vein a considerable amount of argentiferous galena occurred, which, however, became nearly exhausted in going fifteen feet into the vein.

These rocks are apparently of lower Silurian age, perhaps members of the Quebec Group of the Canadian geologists. Among them are Quartzites, micaceous schists, containing in abundance large crystals of Staurotide, clay slates, limestone, etc. These occur largely in Vermont and Canada, and a wide belt of similar rocks passes through the State of Maine. Several other veins containing Galena and copper pyrites, have been opened in the vicinity of Lisbon.

Mr. N. S. Shaler made a communication on the formation of mountain chains.

The President read a letter from Dr. B. A. Gould, presenting in behalf of the U. S. Sanitary Commission, a complete set of measuring apparatus, consisting of an andrometer, spirometer, dynamometer, calipers, etc.

The thanks of the Society were returned to the Sanitary Commission for this valuable donation.

Mr. Henry M. Wellington and Dr. J. F. Adams of Boston, were elected Resident Members.

DONATIONS TO THE MUSEUM FROM JAN. 1 TO MAY 2, 1866.

January 3, 1866. Travertine from Vermont, by Mr. Marshall Tidd. Cranium from an excavation at the Golden Gate, San Francisco, Cal., by Dr. C. A. Kirkpatrick, U. S. A. Cranium of a Piute Indian from an ancient battle field at Austen, Nevada, by Dr. C. T. Jackson. Crania of the Horse and Ass from Africa, by the Boston Milling and Manufacturing Co. Mud cells of *Pelopæus* from Brownville, Texas, by Major H. Bumstead. *Cardium Cooperi* Gabb, and *Amauropsis alveolatus* Conrad, from the Cretaceous rocks at Santa Barbara, Cal.; Native Borax from Clear Lake, Lake Co., Cal.; recent shells from the coast at Santa Barbara, Cal., by Dr. C. T. Jackson. Cast of the head of the *Dodo* from the Museum at Oxford, England, by Dr. George Rolleston. The following species of land shells from Cuba: *Planorbis* (Discus) *albicans* Pfr., *Proserpina depressa* Orb. var., from Cardenas; *Cyclostoma Lachneri* Pfr., from Sagra de Panamo; *Cyclostoma choanopoma* Gundl., from the mouth of the Yaterno River; *Helix rufo-apicata* Poey, from Gibaru; *Helicina elegans* Gundl., *H. jucunda* Gundl., from Guayaibou; *Helicina straminea* Mor., from Rancho Lucas, by Dr. Juan Gundlach. Leaf of the Murævilla Tree from Equador, by Dr. C. F. Winslow. Cast of the skull of *Chæropus minor*, received in exchange from Acad. Nat. Sci. Philadelphia.

February 7. Numerous shells from the Quaternary formation at Gardiner, Maine, including a tooth of the Bison; tertiary fossils from the Mediterranean Sea, and other fossils. Specimen of the Polished Rocks from Smoky Valley, Nevada; Femur of an Indian from a "Refuse Heap" of clams, etc., at Plymouth, Mass.; Humerus which had been perforated at the olecranon fossa, from an Indian grave at Chelsea, Mass.; Zygænid larvæ, pupæ and moths, found feeding on the Evergreen Oak, San Francisco, Cal., by Dr. C. T. Jackson. Ores of Lead, Zinc and Copper from the Isle of Mann, Great Britain, by the Agassiz Natural History Society, Cambridge, Mass. *Syngnathus peckianus* Storer, from Massachusetts Bay, by Mr. R. C. Greenleaf. Specimens of Silurian fossils, from Straits of Belle Isle, Labrador, supposed to have been transported on ice from the Arctic regions, by Dr. A. S. Packard, Jr. Skull of the Polar Bear, from Arctic America, by Dr. J. K. Warren.

February 21. *Salmo immaculatus* H. R. Storer, Hopedale, *S. salar* Linn., young, Belles Amours, *S. hudsonicus* Suckley, *Mallotus villosus* Cuvier, *Gadus arenosus* Mitch., *Ammodytes dubius* Reindt., *Gymnacanthus Patris* (Storer), Henley Harbor, *Pygosteus Cuvieri* Brevoort, Caribou Is., Straits of Belle Isle, *Salmo Trutta?* Isle of Ponds, Domino Harbor, *Sebastes norvegicus*, from Labrador, by Dr. A. S. Packard, Jr.

March 7. Three snakes, and one hundred and ten insects, from Pensacola

Fla.; four snakes and two turtle eggs from New Orleans; a bat and two hundred insects from Mobile; seeds of Palma Christi; Teeth of the "Sheep's Head" fish, by Dr. S. Kneeland, Jr. A new variety of Bitumen from Utah Territory, by Prof. William Denton.

March 21. *Campylodiscus* and other Diatomaceæ from Colberg, Prussia, by C. G. Bush. Thirty specimens of ores from California and Nevada, by Dr. C. T. Jackson.

April 4. Fifty-four species of Mollusca from Panama, the types of Prof. C. B. Adams; eighty-nine species from Vancouver Island and California, named by P. P. Carpenter; Shells collected by the U. S. Exploring Expedition, named from the Cumingian Collection; Shells collected by the U. S. Exploring Expedition, and named from Dr. Gould's types; Mollusca, mostly marine, collected at Mazatlan, by P. P. Carpenter, and forming his types, by the Smithsonian Institute. An Indian stone axe and a fossil shell, by Mr. A. E. L. Dillaway. A collection of Reptiles, mostly from this State, by Mr. S. Hinckley. Indian Poison from the Amazon River, near the boundary of Peru, by Mr. Van Rensellaer Thayer.

April 18. Sixty specimens of minerals, sixty specimens of exotic shells and a few corals, from Mr. Nathan Appleton. Leeches taken from the clam, *Mya arenaria*, by Mr. C. C. Sheafe. Fruits from various localities; four exotic Crustacea, by Mr. E. R. Mayo. Two hundred species of marine invertebrates from Labrador, sixty species of marine invertebrates from the coast of Maine, by Dr. A. S. Packard, Jr. Sand from the sea-bottom at Grand Bank of Newfoundland; *Hyas aranea*, *Toxopneustes dröbachiensis*, *Cynthia pyriformis*, *Pecten islandicus*, *Buccinum undulatum*, *B. Totteni*, *Natica helicoides*, *Cyrtodaria siliqua*, *Mactra polynema*, from the Grand Bank of Newfoundland, by Capt. N. E. Atwood.

May 2. *Callidium antennatum*, found boring in the Red Cedar, by Mr. F. W. G. May. Sternum of a Flamingo, and Fungi from Inaqua, Bahama Islands, March, 1866, by Dr. H. Bryant. Cocoon and Chrysalis of *Samia Cecropia* from Louisville, Ky., by Prof. J. Lawrence Smith. Copper ore, from Iron Ore Hill, Franconia, N. H., by W. E. Coffin & Co. Fungi; the Sternum of a Flamingo; and the Calvarium of a native, from a cave on Moneague Island, one of the Bahamas, by Dr. H. Bryant.

BOOKS RECEIVED DURING THE YEAR ENDING MAY 2, 1866.

Observations on the Geology of Southern New Brunswick. By L. W. Bailey, A.M. 8vo. Frederickton, 1865. *From the Author.*

On the Origin and Formation of Prairies. By Leo Lesquereux. 8vo. Pamph. New Haven, 1865. *From the Author.*

Ueber Getreideverwüster. Von Gust. Ad. Künstler. 8vo. Pamph. Wien, 1864.

Compte rendu provisoire de quelques observations qui prouvent que le Podisoma Sabinæ, et le Roestelia cancellata sont des générations alternantes de la même espèce de champignons. Par A. S. Örsted. 8vo. Pamph. Copenhagen, 1865. *From the Author.*

Défense des Colonies. Par Joachim Barrande. 8vo. Paris, 1865. *From the Author.*

Cretaceous Reptiles of the United States. By Joseph Leidy, M.D. 4to. Philadelphia, 1865. *From the Author.*

Address to the Geological Section of the British Association, Birmingham, 1865. Delivered by the President, Sir R. I. Murchison. 8vo. Pamph. *From the Author.*

A Preliminary Report on the Geology of New Brunswick. By H. Y. Hind. 8vo. Fredericton, 1865. *From the Author.*

Results of Observations on the Drift Phenomena of Labrador and the Atlantic Coast southward. By A. S. Packard, Jr., M.D. 8vo. Pamph. New Haven, 1866. *From the Author.*

On the Anatomy of Vertebrates. Vol. I. Preface. By Richard Owen. 8vo. Pamph. London, 1866. *From the Author.*

Annual Meteorological Synopsis for the year 1865. By J. B. Trembley, M.D. 8vo. Pamph. Toledo, Ohio. *From the Author.*

Catalogue of Birds found in the Vicinity of Waterville, Me. By Charles E. Hamlin. 8vo. Pamph. 1865. *From the Author.*

A Synonymical Catalogue of North American Sphingidæ, with Notes and Descriptions. By Aug. R. Grote and Coleman T. Robinson. 8vo. Pamph. Philadelphia, 1865. *From the Authors.*

Das gesez der zwillingsbildungen am stein, fon Teodor fon Gutzeit. 8vo. Pamph. Riga, 1865. *From the Author.*

Morphologische Bemerkungen über Lobelia Dortmanna L. Von Dr. Franz Buchenau zu Bremen. 8vo. Pamph. *From the Author.*

A Catalogue of the Palæozoic Fossils of North America. By B. F. Shumard, M.D. Part I. Echinodermata. 8vo. Pamph. St. Louis, 1866. *From the Author.*

Memorial Sketch of Thomas Bridges. By W. H. Dall. 8vo. Pamph. San Francisco, 1866. *From the Author.*

Spicilége de la Flore Bruxelloise. Par Félix Muller. Fasc. I–II. 8vo. Bruxelles, 1864. *From the Author.*

Observations on the Function of the Liver. By Robert McDonnell, M.D. 8vo. Dublin, 1865. *From the Author.*

Notes on the Bombycidæ of Cuba. By Augustus Radcliffe Grote. 8vo. Pamph. Philadelphia, 1865. *From the Author.*

The Distribution and Migration of North American Birds. By Spencer F. Baird. 8vo. Pamph. New Haven, 1866. *From the Author.*

Flora Brasiliensis. Fasc. XXXIX–XL. Argumentum Fasciculorum I–XL. fol. Lipsiæ, 1865. *From Mrs. B. D. Greene.*

Twelfth Annual Report of the Secretary of the Massachusetts Board of Agriculture. 8vo. Boston, 1864. *From C. L. Flint.*

Report of the National Academy of Sciences for 1863. 8vo. Washington, 1864. *From Dr. A. A. Gould.*

Bibliotheca Historico-Naturalis, Physico-Chemica et Mathematica. July to December, 1864. 8vo. New York. *From B. Westermann & Co.*

Second Annual Report of the Board of Directors of the Long Island Historical Society. 8vo. Pamph. Brooklyn, 1865. *From J. C. Brevoort.*

A Memorial of Joshua Bates, from the City of Boston. 8vo. Boston, 1865. *From the Trustees of the Public Library.*

Supplement to the Ichnology of New England. A Report to the Government of Massachusetts in 1863. By Edward Hitchcock, D.D. 4to. Boston, 1865. *From C. H. Hitchcock.*

Sea-Side Studies in Natural History. By E. C. and A. Agassiz. 8vo. Boston, 1865. *From A. Agassiz.*

Report of a Geological Survey, by Messrs. Partz and Buck, of the Property of the Wallace Nickel Mining Company. 8vo. Pamph. New York, 1864. *From G. P. Huntington.*

International Statistical Congress at Berlin. V. Session. On the Military Statistics of the United States of America. By E. B. Elliott. 4to. Pamph. Berlin, 1863. *From C. J. Sprague.*

Musée Vrolik. Catalogue de la Collection d'Anatomie Humaine, Comparée et Pathologique de M. M. Ger. et W. Vrolik. Par J. L. Dusseau. 8vo. Amsterdam, 1865. *From the family of M. Vrolik.*

Report of the Commissioners concerning the Obstruction to the Passage of Fish in the Connecticut and Merrimack Rivers. 8vo. Pamph. 1866. *From Theo. Lyman.*

Catalogue des Oiseaux de la Collection du feu M. le Baron Lafresnaye de Falaise. 8vo. *From Dr. Henry Bryant.*

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LIST OF WOODCUTS IN THIS VOLUME.

ERRATA.

Page 16, line 33, *for* Cæsium, *read* Cæsia.
Page 16, line 34, *for* Rubidium, *read* Rubidia.
Page 33, line 1, *for* Dr. *read* Mr. C. A.
Page 49, line 17, *for* fossils,—with, *read* fossils. With.
Page 49, line 19, *for* mountains. The, *read* mountains, the.
Page 50, line 7, *for* cenerea, *read* cinerea.
Page 50, line 8, *for* Portulucca, *read* Portulacca.
Page 92, line 16, *for* tropical, *read* typical.
Page 200, note, line 2, *for* Zermeyer, *read* Termeyer.
Page 200, note, line 3, *for* de Rogni, *read* de 'Ragni.
Page 217, line 12, *for* edge, *read* edged.
Page 220, line 37, transpose "in" to the beginning of the sentence.
Page 221, line 17, transpose "Harris" and "Say."
Page 267, the date of the signature should be April, 1866.
Page 271, last line, *for* breath, *read* breathe.
Page 282, note *, *for* II. III, *read* IV. p. 336, note.
Page 295, line 15, *for* rings, *read* wings.
Page 313, line 4, *for* Hanalai, *read* Hanalei.
Page 369, line 4, *for* Berlin, *read* Leipzig.

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