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PROCEEDINGS

OF THE

BOSTON SOCIETY OF NATURAL HISTORY.

TAKEN FROM THE SOCIETY'S RECORDS.

January 1, 1862.

The President in the chair.

Mr. Wilder described the muscles which move the snout of the hog. The elevator has a very long tendon, and its muscular attachment is very far back, protected by a long ridge, and safe from all ordinary accidents; the depressor, on the contrary, is very short, and attached very near the terminal cartilage, both muscles of the important organ being thus protected from injury. He remarked that while we consider the long snout of the hog, compared with that of common animals, as a sign of what we known to be his beastly nature, yet the same organ, still further prolonged into the trunk of the elephant, changes its function with the nature of the animal so as to be capable of executing very various and delicate motions. So that it is not always safe to take a single organ as an index of the nature of the possessor.

Mr. Marcou observed, in regard to deep-sea soundings, that a Norwegian naturalist had recently obtained, by means of the same instruments used by Capt. McClintock and Dr. Wallich, between Cape North and Spitzbergen, living animals from a depth of 8400 feet (more than 1½ miles); at this depth, where the temperature was only three-tenths of a degree centigrade (nearly the freezing point), were found living polyps, mussels, tunicata, annelides, and bright-colored crustaceans. The same naturalist had found ammonites (probably Jurassic), and leaves resembling those of the palmetto (probably miocene), at Spitzbergen.

Mr. Stodder read a paper "On the structure of the Valve of the Diatomaceæ," and exhibited specimens of great beauty under the microscope.

On the Structure of the valve of the Diatomaceæ. By Charles Stodder.

There are recorded a few observations which mention the existence of more than one plate of silex in the valve of some three or four species of Diatoms. Mr. Shadbolt (Trans. Mic. Soc. 1st series, vol. iii., p. 49) describes the valve of *Arachnoidiscus Japonicus* as consisting of two layers. Mr. Ralfs (Pritchard's Infusoria, 4th ed., p. 839) says the valves of *Actinoptychus undulatus* "frequently consist of two dissimilar plates, one having the usual character, the other being triradiate and minutely punctate, and which has been described as a new species by Mr. Roper, who first observed it detached from the true valve. He and others have since found the plates *in situ*." Dr. F. W. Lewis (Notes on new and rarer species of Diatomaceæ, Phil., 1861, p. 6), describing *Navicula marginata*, speaks of "the outer silicious plate." Schleiden (Pritchard, 4th ed., p. 41) speaks of "two leaves lying one over the other." Mr. Brightwell says of the lorica of *Triceratium* that "the valves are resolvable into several distinct layers of silex, dividing like the thin layers of talc." (Pritchard, p. 49.) These are all the authorities I can find that intimate the existence of more than one plate of silex in the valve.

Ehrenberg describes several species of Diatoms as "veiled," — a most happy term as expressive of the appearance of those species to which it is applied. Neither Ehrenberg nor any other microscopist has offered any explanation of the cause of this appearance. Among the species thus distinguished, are the four species of *Heliopelta*, though the fact is not mentioned in any of the published descriptions, all of which are more or less imperfect.

Some time ago I found a broken specimen of *Heliopelta*, which exhibited clearly portions of the valve with the normal characters of the genus, and, extending beyond the broken edges, portions of another and inner plate of an entirely different structure. A few months since, Mr. J. S. Melvin gave me specimens of a Diatom, as possibly a new species. On examination of these I found that he had obtained the inner plate of the valve of *Heliopelta Lewenhoeckii* entire and perfect. I have since found other specimens in my own collection. This plate under low or medium powers shows only exquisitely fine lines; but with a high power ($\frac{1}{12}$) it is resolved into minute spherical granules of silex, arranged in parallel rows, radiating toward the margin of the disc, placed in contact with each other, and cemented together at their peripheries, the cement filling the interstices. There is a distinct line corresponding to the divisions of the compartments of the outer plate; a triangular blank at the junction of these lines with the margin, a conspicuous feature in the view of the perfect frustule; a star-shaped blank in the centre, the rays of the star being in number one-half of that of the compartments of the disc. *Heliopelta* has the disc divided into six to twelve rays or compartments, one-half of them having distinctly hexagonal areolæ, the alternate half having an entirely different kind of mark, which has never been perfectly described or figured. Dr. Carpenter's description is, perhaps, the best, but his figure is one of the most inaccurate. (Carpenter on the Microscope, Phila., p. 290.) The blank star of the inner plate is also a conspicuous feature of the perfect disc, and the rays of this star always coincide with the compartment last described. The inner plate also shows marks indicating the position of the marginal (improperly so called) spines; and under a high power shows also faint impressions of the areolæ of the outer plate, which I consider proof that the two plates were in actual contact. It is this inner plate that gives the veiled appearance to this and other Diatoms, and I take the "veil" in all cases as a visual proof of the existence of the inner plate. Dr. Carpenter says of *Heliopelta*, that a minute granular structure may be shown to exist over the whole of the valve, — "that the circular areolation exists in a deeper layer of the silicious lorica."

Now, I am certain that Dr. Carpenter was mistaken in this last remark, though, perhaps, not in what he saw. He had simply observed a valve with the inside toward the eye. I have repeatedly seen them in this position, and with the same effect. I have also found what I take to be the inner plate of an *Omphalopelta* entire; but the evidence of its connection with that genus is not quite complete.

A few weeks since I found a broken specimen of *Coscinodiscus*; the hexagonal areolæ were large and distinct, and extending beyond the broken edges, just as described in the *Heliopelta*, was another part of the disc which was simply granular, with a milky aspect. This is the inner plate of the valve of that genus. Since that I have found numerous examples of the same kind, and am now satisfied that they are quite common, and that others as well as myself must have seen them often before, without being aware of their nature. Like the corresponding plate of *Heliopelta*, this is composed of spherical granules of silex, but instead of being in close contact, they are distant, and joined or cemented together by a thin plate of silex, the arrangement and place of the particles being governed by that of the hexagons of the outer plate, one granule being placed against each hexagon. By careful adjustment of the focus of the instrument, with a power proportioned to the size of the areolæ, the granules can be seen in the centre of the hexagons; care must, however, be taken not to confound an optical effect with the appearance of the granules; each areola is a minute lens, and so refracts the light as to give a bright or dark dot as the focus is changed, and the granules themselves contribute to this effect. Practice, however, will enable one to distinguish these effects.

The species *Eupodiscus Argus* and *Rogersi* present strong evidence of the inner plates; so, also, do some specimens of *Isthmia nervosa*, of *Epithemia*, *Achnanthes*, and *Polymyxus coronalis*. I think I have seen indications of them in several other genera. In some of the *Pinnularia* and *Navicula* there are appearances which I can explain only on the supposition that the valve is composed of two plates, as suggested by Schleiden. Sufficient, I think, has been proved to warrant the generalization that the valve of the Diatomaceæ consists of at least two plates of silex, the inner one of a structure more or less differing from that of the outer, giving that peculiar appearance to those species described as veiled, — partly the cause of the dots in the hexagonal areolæ of some species,— and often, probably, explaining the varying descriptions and figures of different writers.

There is a difference of opinion among Diatomists as to the shape of the dots or marks of the very finely marked kinds, such as the whole of the genus *Pleurosigma* (Smith), — *Gyrosigma* (Hassal), Mr. Wenham, by magnifying photographs of *P. angulatum* to 15000 diameters, has proved, as I think, that the areolæ of that species (and undoubtedly of all the species with diagonal lines) have hexagonal areolæ, exactly like those of *Coscinodiscus*. Professor O. N. Rood, of Troy, by the same process, has obtained photographs of the same species (7000 diameters), which he thinks prove the areolæ to be circular. Professor Rood's photographs show some indications of the hexagonal form, and I believe the difference between his figures and Mr. Wenham's must be owing to some difference in the manipulation. The areolæ of the coarsely-marked forms being unquestionably hexagons, it is probable, from analogy, that those of the finer forms are so also. Mr. Wenham, as quoted by Professor Rood, "states that he has ascertained by a $\frac{1}{50}$th that the markings of this object are due to spherical particles of quartz." (Am. Jour. Science, Nov., 1861, p. 336.) This observation, with the discovery of the inner plate of the *Coscinodiscus*, and its structure, makes the analogy of the structure of the two genera complete, and may be considered as proving the existence of the inner plate in this genus.

Another point in the structure of the valve has been a subject of much difference of opinion — some contend that the areolæ are elevations, others that they are depressions. Dr. J. W. Griffiths gives, in the Micrographical Dictionary, his reasons for considering them to be depressions. I have reasons for thinking that neither party has the true explanation of the structure. My opinion is that the exterior of the shell is smooth or nearly so, and that the borders of the hexagons, or other shaped areolæ, and costæ of the costate forms, are internal projections from the outer plate, as on the under side of the leaf of the *Victoria Regia*, intended to give strength to the cell with the smallest quantity of material. This will explain the trace of the hexagons seen on the inner plate of *Heliopelta*, as only the projecting wall of the areolæ would come in contact with the inner plate. Dr. Griffiths reasoned that the areolæ were depressions because they were the thinnest parts of the shell; the facts are correct, but the inference may not be, as there is another explanation of the phenomena.

In company with Dr. C. T. Jackson, I have dissolved a shell of *Coscinodiscus* under the microscope, with caustic potash, and found that the area of the cellules was dissolved before the walls, and that therefore they are the thinnest parts, as Dr. Griffiths judged from the optical effect.

Mr. Marcou stated that the last steamer for Europe from this port had taken out clams, oysters, lobsters, and other marine animals of our coast, for the purpose of acclimatizing them on the Atlantic and Mediterranean coast of France.

A donation of insects, fish, crustaceans, a snake, and a specimen of the wild potato, from the island of St. Lorenzo, on the coast of Peru, opposite Callao, was presented in the name of Dr. C. F. Winslow. A letter accompanied the specimens, from which the following are extracts : —

The potato is the most important, which I send with the hope that some of you will cultivate it. It is the wild potato, and the same as those which were found by the early Spanish settlers in this country, and first taken from St. Lorenzo for cultivation, and from which have probably sprung all the varieties of potatoes cultivated by civilized nations. Its favorite haunt seemed to be in light, fine soil, near or under the edge of stones. It is not very abundant on that part of the island which I explored. Helices abound in countless numbers. They are observed scatteringly at first, about four hundred feet above the sea, on the dry, loose sand attached to some loose stone or lump of sand hardened by the mists. They gradually increase in number as you ascend, over enormous areas of drifting sand brought by the strong south-west winds from the western coast of the island. On the higher slopes of the highest ridge, the soil looks dark as observed from below, and in the numerous gulleys that can be seen to descend from the summit there is a line of white color following the tortuosities of their course. These lines would deceive the thirsty pilgrim with the delusion of foaming torrents, did he not know that it never rains on this coast. I could not imagine what produced such an appearance of dashing foam. However, on coming upon the higher altitudes, and upon the dark and ashy soil 600 or 800 feet high, I found the helices much more numerous, and attached in vast colonies to clusters of mosses, and upon stones, and upon each other; and, on suddenly coming to the end of one of the gulleys above described, I was astonished to find what appeared to be narrow, dashing torrents, to be in reality infinite myriads of dead helices which had blown from the slopes down into the gulleys.

Darwin visited this island during his voyage in the Beagle. He gives a brief description of his observations in his published memoirs. I, also, saw many shells on the island lying loose upon the surface of the hills, all the way from fifty to eight hundred feet above the sea. But they seemed to me to have been dropped by birds, for where I saw very old ones partly decayed, I also saw fresh ones which, to all appearances, had not been dropped many hours.

On the Isthmus I made extensive observations and dissections of cocoanuts, from the youngest fruit upwards, the results of which confirm all my own conclusions expressed the last evening I met the Society, and disprove wholly the possibilities suggested by Professor Agassiz. I will communicate on this subject hereafter.

Mr. L. Lincoln Thaxter was elected Resident Member of the Society, and Mr. George Mixter, of Harwich, Mass., a Corresponding Member.

January 15, 1862.

The President in the chair.

Mr. Alexander Agassiz gave a description of a remarkable annelid found in considerable numbers along the coast of Massachusetts, *Autolytus cornutus* (*Sacconereis*), presenting the phenomena of alternate generation. (See Journal, vol. vii., part iv.)

A valuable donation of objects of Natural History, and specimens of the manufactures of the East Indian and Pacific nations, was presented by the Boston Marine Society. It comprised between fifty and sixty birds, mostly East Indian and African, many of them rare, and new to the Society's collection — jaws, teeth, horns, skulls, reptiles, fishes, shells, and several botanical specimens. Also a large collection of the handicraft of savage and semi-civilized nations — such as models of canoes and junks from China, Malacca, Burmah, the Pacific Islands, and the North-west Coast; war clubs and insignia of office; Malay, African, and Pacific Island cutting weapons, spears, bows and arrows, quivers, and paddles; native cloth and tanned skins; head-dresses, and other articles of wearing apparel; gourds, bags, cups, pipes, fans, and ornaments; a Feejee Island pillow of wood, and miscellaneous articles too numerous to mention.

The following resolutions were adopted: —

Resolved, That the thanks of the Boston Society of Natural History be given to the Boston Marine Society for the very valuable collection of birds, and other objects of Natural History, articles of East India manufacture, &c., presented January 15, 1862.

Resolved, That the Members of the Boston Marine Society be invited to visit the rooms of the Boston Society of Natural History, in the present, or new building, whenever it may suit their convenience.

Resolved, That the Boston Marine Society are entitled to the thanks of this Society, and of the community, for their efforts to procure, through the instrumentality of their organization, objects of natural science and curious specimens of human art from all parts of the world, and that they be earnestly requested to continue these efforts, in all the commercial enterprises in which they may be interested, — that Boston may be second to no other city in the country for its collection of objects of nature and art, gratuitously opened to public inspection.

Messrs. Philip R. Uhler, of Baltimore, and Joseph A. Clay, of Philadelphia, were elected Corresponding Members.

February 5, 1862.

The President in the chair.

The following paper was presented, and referred to the Publishing Committee.

DESCRIPTION OF NEW SPECIES OF FOSSILS FROM THE DEVONIAN AND CARBONIFEROUS ROCKS OF THE MISSISSIPPI VALLEY, BY CHARLES A. WHITE, OF BURLINGTON, IOWA.

ECHINODERMATA.

CRINOIDEA.

Genus CYATHOCRINUS Miller.

CYATHOCRINUS RIGIDUS (n. s.) Body subglobose, basal plates rather small, tumid in their centres, presenting a somewhat pentapetalous appearance; subradials rather large, convex and protuberant, about as wide as high; first radials as wide as high, about the same size as the subradials, a little wider below than above; articulating facet occupying the greater part of the width of the plate, and reaching down nearly half its length, slightly excavated, and having a good-sized notch in its upper margin; second radials small and short; third radials wider and larger than the second, and upon these the arms strongly diverge; in a part of the arms the second bifurcation takes place upon the same plate which rests upon the third radial, and the third bifurcation, in some of these, occurs on the second plate from the second bifurcation. The lower arm-plates are short and strong, the upper ones are long and rather slender, and, being slightly curved in different directions, give the arms a rigid appearance, which is increased by slight angularities on their backs. Surface of the body-plates covered with numerous small, irregular nodes, which are sometimes rather sharp and prominent, and have a tendency to arrange themselves in radiating lines from the centres of the plates. Suture lines distinct, giving a prominent appearance to the plates. Column round, moderately strong, and composed of rather thin joints of alternating width.

This species is of about the same size and general form as *C. viminalis* of Hall, but its surface-markings and peculiar arms will readily distinguish it from any other described species in these rocks.

Locality and position, in the lower division of the Burlington Limestone, Burlington, Iowa. — My own cabinet.

CYATHOCRINUS KELLOGGI * (n. s.) Body robust, wider than high; basal plates of moderate size, rounded, truncated, and slightly exca-

* Dr. G. M. Kellogg, Keokuk, Iowa.

vated for the attachment of the column, which is not large, and has a small central perforation; subradials about as wide as high, very tumid, projecting from the body as fine strong nodes; first radials massive, prominent in the middle, wider than high, bending inward a little between the arms; arm facets prominent, subcircular, slightly excavated, with a moderate-sized notch in the upper side, and the lower margin sharply projecting; anal plate quadrangular (?), nearly as wide where it rests squarely on the subradial as at the top; suture lines not very distinct; four or five indistinct, parallel, radiating ridges pass from the middle of each subradial plate to each of the adjacent plates, being more distinct where they cross the suture lines than on the more prominent parts.

This species may be easily distinguished from others with which it is associated by its radiated surface, very tumid subradial plates, subcircular arm facets, and its having the true structure of *Cyathocrinus*, not approaching *Poteriocrinus*, as do some of the Keokuk Limestone species.

Locality and position, in the Keokuk Limestone, near Burlington, Iowa. — Cabinet of Rev. W. H. Barris.

Genus Poteriocrinus Miller.

Poteriocrinus ob-uncus (n. s.) Body cup-shaped, about one third wider than high, upper edge of the calyx much bent in between the arms; basal plates small, truncated for the attachment of the column, which is of medium size, with a small central perforation, bent up at the sides to meet the subradials, which are moderately large, about as wide as high; first radials larger than the subradials, wider than high, prominent at the base of the arms, giving the calyx a sub-pentagonal outline; arm facets occupying about one-third of the width of the first radials, subcircular, with a broad notch in their upper margins, and a minute perforation in the centre just below the notch, with a fine groove connecting them. Anal plates, two visible in our specimen, one quadrangular, rather small, and situated partly beneath the first radial of the right posterio-lateral ray. Surface granulose, with a tendency of the granules to form radiating lines. Suture lines distinct, with depressions at the angles of the body-plates.

This species has the aspect and form of *Cyathocrinus*, but approaches *Poteriocrinus* more nearly in the number and oblique position of the anal plates. It is the first specimen I have observed which shows the subcentral perforation in the arm facet, in rocks of this age, although this peculiarity is not uncommon in species of this genus in rocks of the age of the Upper Helderberg Limestones.

Locality and position, in the lower division of the Burlington Limestone, Burlington, Iowa. — Collection of Rev. W. H. Barris.

Poteriocrinus salignoideus (n. s.) Body small, deeply cup-shaped, height about the same as the width at the arm bases, spreading very gradually with a slight outward curve from the base, which is truncated and excavated for the attachment of the column, which latter is proportionally large; basal plates rather short, bent up abruptly at their outer edges; subradials moderately large, higher than wide, three hexagonal, and two heptagonal; first radials a little broader than high; arm facets sub-semicircular, with a broad notch in their upper margins, prominent, occupying a little more than one-half the width of the plate, the upper edges of the plates between the arms slightly bent in; second and third radials small, about equal in size, wider than high; fourth radial of about the same size as the second and third, but is pentagonal in outline and supports the arms, and from which they diverge rather abruptly; above this the arms, which are long and slender, again bifurcate three or four times. Surface smooth or finely granulose; sutures not distinctly marked. Resembles *P. tenuibrachiatus* of Meek and Worthen, but the body is less globose in form; the arms are not so broadly rounded on their backs; each ray has four primary radials, the anterior one in their species having five; the second division of the arms takes place on the third piece from the fourth radial, while in their species this division takes place on the fourth piece.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Collection of Mr. Charles Wachsmuth.

Poteriocrinus bursæformis (n. s.) Body in the form of an inverted, truncated cone, spreading directly to the arm bases, where it is broader than the height; basal plates of moderate size, bending upward in a direct line with the other plates; subradials about as high as wide, three hexagonal, and two heptagonal; first radials much wider than high, almost straight across their upper edges, the second radials occupying the full width, and are, with the exception of the anterior one, short and pentagonal, supporting an arm of six broad, short plates on each of their upper sloping sides, above which they again bifurcate once or twice; second anterior radial quadrangular, about as high as wide; third and fourth short, more than twice as wide as high, the latter largest, and supporting two arms, which bifurcate twice, making six arms for this ray; the full number for each of the other rays seems to have been eight, making thirty-eight arms in all. The arms, except at their upper ends, are flat on the back, and join each other closely at their sides, as in *Bursacrinus*, except at their upper ends. Anal plates three, or more (?); first pentangular, and situated partly beneath the right posterio-lateral first radial. Surface smooth, or finely granulose; suture lines not very distinct; column round, of medium size.

This species not only resembles *Zeacrinus* above the base, but possesses those characters which have been regarded as peculiar to that genus, of having but two radials to four of the rays, and a greater number to the anterior one, yet the body has the true form and development of *Poteriocrinus*.

From *P. calyculus*, Hall, it differs in the peculiarity of the radials just mentioned, and the proportions of the body-plates. From *P. lepidus*, Hall, it differs in having a less number and less massive radials, and being without the distinctly marked suture-lines and the depressions of the angles of the body-plates which that species has.

Locality and position, in the lower division of the Burlington Limestone, Burlington, Iowa. — Collection of Rev. W. H. Barris.

Genus BURSACRINUS Meek and Worthen.

BURSACRINUS CONFIRMATUS (n. s.) Body rather rapidly spreading to the top of the second radials, which are prominent, and pointed at their upper extremities, giving the body at this point a stellate outline when viewed from below. Basal plates unknown; subradials small, about as wide as high; first radials nearly twice as wide as high, the lower angle made somewhat acute by the slight concavity of the lower sides; upper margins broadly concave, or nearly straight; second radials rather larger than the first, the lower sides slightly convex, the upper sides sloping with an obtuse angle, which is made to appear more acute than it really is, by the forementioned projections; arm-plates about twice as wide as high, convex transversely, leaving a distinct depression of the arm-sutures, and having a small angular prominence at the middle of their upper sides.

The only known specimen of this species was in the cabinet of the writer two years before the publication of the genus to which it is now referred. It was known to possess new generic characters, but the specimen was thought too imperfect to found a new genus upon; yet it affords specific characters which cannot be mistaken, and is referred without doubt, and with much satisfaction, to the genus *Bursacrinus* of Messrs. Meek and Worthen, since it conforms to and fully confirms that genus, which was founded upon a single specimen.

Locality and position, in the lower division of the Burlington Limestone, Burlington, Iowa.

Genus ZEACRINUS Troost.

ZEACRINUS PERANGULATUS (n. s.) Calyx more than twice as wide as high, base rather broad, deeply excavated; basal plates very small, covered by the column, which is not large, round, and composed of thin, alternating joints; subradials of medium size, about as wide as high; first radials the largest, plates of the calyx wider than high; second radials a little larger than the first, pentagonal, and supporting each a pair of arms, except the anterior one, which is quadrangular, and supports three other smaller radials; the two first are also quadrangular, and the last pentangular, supporting two arms, which bifurcate on the eighth plate, giving four arms to the anterior ray; on each of the anterio-lateral rays the second bifurcation takes place on the sixth arm-plate from the second radial, one arm being simple from this point to the end, but the other again bifurcating on the eighth plate from the second bifurcation, making six arms from each of these rays; and as the posterior rays doubtless had the same number, the whole number of arms was probably twenty-eight. The plates of the calyx are marked by radiating ridges diverging from each plate to the others, except within the basal depression, which is smooth. The body-plates are also depressed at the angles, which gives it a still more angular appearance. The second radials are constricted in the middle, sharply angular on their backs, and truncated below, abruptly sloping to the sutures between them and the first radials. The backs of the arms, particularly on their lower parts, are very angular, with deep depressions between them; and small angular projections garnish their sides where they abut together, giving them a serrated and very angular appearance. Tentacles strong, not very closely arranged. One specimen shows part of an inflated proboscis, which is composed of small angular plates, and extended far up within the arms. This species is too conspicuously different from any other to need comparison.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Collections of Rev. W. H. Barris and B. J. Hall, Esq.

ZEACRINUS SACCULUS (n. s.) Body subglobose, contracted at the junction of the arms; concavity of the base small, taking in but a small part of the subradials; basal plates small, covered by the last joint of the column; subradial plates six; five of them reaching the basal plates, one of which is large, being situated beneath the right posterio-lateral ray; the sixth smaller than the others, quadrangular, not reaching the basal plates, and situated nearly beneath the right anterio-lateral ray; first radials broader than high, straight on their upper sides, one hexagonal, three pentagonal, and one subquadrangular, which last is on the right posterio-lateral ray; second radials much broader than high, their upper lateral angles depressed, their upper central ones prominent; four of them pentangular, supporting two arms each; one quadrangular, supporting two other small radials, the latter supporting two arms, which bifurcate once, on the sixth or seventh plate from the fourth radial, giving four arms to this ray; each of the arms of the other rays bifurcate on the sixth plate from the second radial, and a part of the arms thus thrown off bifurcate again farther up, giving six arms to each of these rays, — twenty-eight arms in all. These abut together laterally, leaving but a slight depression along the sutures, giving the whole the appearance of a small pouch, a little inflated in the middle, and contracted at the top and the base of the arms, leaving no space except the anal area, which is neatly filled with two or three anal plates, the lower one the largest, pentangular, and forming a part of the calyx. Suture lines of the body-plates not very distinctly defined. Surface smooth or finely granulose.

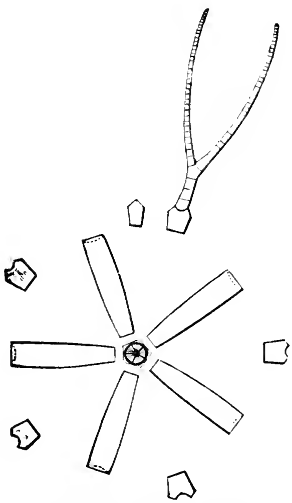
Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Collection of Rev. W. H. Barris.

ZEACRINUS SACCULUS var. CONCINNUS. Another specimen, apparently younger, from the same locality and position, presents no differences from the preceding species above the radials; the subradials, however, are only five, a little tumid, and proportionally smaller, making the calyx a little lower; the anal series also consists of one more plate; it is probable, however, that the quadrangular subradial of the preceding species is of abnormal development, and that, were this absent, the number of anal plates would be one more.

Several specimens of a species of crinoid belonging to the family of *Cyathocrinidæ* have been discovered in the upper division of the Burlington Limestone, at Burlington, which is so peculiar in its form and structure, as to render its reference to any known genus quite improper, for which I propose the generic name of *Belemnocrinus*.

The following diagram and outline figure will show its structure and form:—

FIG. 1.



BELEMNOCRINUS TYPUS.

FIG. 2.
The dotted line shows the depth of the visceral cavity.

BELEMNOCRINUS TYPUS.

Genus Belemnocrinus (n. g.)

βελεμνον, a dart; Κρινον, a lily, in allusion to its resemblance to a Belemnite.

Generic formula.

Basal pieces, five; short.

Subradial pieces, five; long, narrow, forming a cylinder which is solid, except that it has a central perforation, and an excavation at its upper end, forming part of the visceral cavity.

Radial pieces, one; large, $\times$ 5, and smaller ones, four, more or less.

Anal pieces, one or more, the first situated between two of the first radials.

The position of the first anal plate is like that of *Cyathocrinus*, but this genus, in the form and proportions of the body, differs widely from all others of the family. Its conspicuous features are its long, solid, cylindrical body (the greater portion of which seems to have performed the functions only of the column), the proportionally long subradials and short basal plates, and the small visceral cavity. In *Agassizocrinus* we have the nearest approach to these peculiar characters of the body-plates, while in *Zeacrinus* we see the farthest remove from them which the family presents. It is probable that in *Agassizocrinus* the thickening of the lower plates of the body was the result of an excrescent secretion of solid matter, which took place as those soft parts of the body were absorbed which were no longer necessary in the animal economy after its separation from the column; but in *Belemnocrinus* the thickening of the body-plates, and the retreating upward of the vital parts, could not have been the result of such a cause, as the column is well developed, and its communication with the visceral cavity uninterrupted.

The only known species of the genus is the following, which, from the simplicity of its form, will probably be appropriately considered its type, should other species be discovered.

Belemnocrinus typus (n. s.) Body resembling a *Belemnite*, or *Belemnitella*, in form, truncated at the base for the attachment of the column, which is proportionally large, composed of alternating thicker and thinner joints, with a small central perforation, round, or indistinctly pentagonal at the upper end, where it has a diameter nearly equal to the basal plates; the sides sloping with gentle outward curves to the column, with only a slight constriction at the junction; basal plates small, and not longer than the thickness of the larger joints of the column, and from which they are not readily distinguishable; subradial plates about four times as high as wide, forming a slightly-inflated cylinder, smallest at the lower end, as solid as the column, except that it has a slight excavation in the upper end which forms a part of the visceral cavity; first radial plates about as wide as high, the arm facets occupying more than half the width of the plates, shallow and somewhat protruding below ; second, third, fourth and fifth radials small, about as wide as high, subcylindrical, except the fifth, which is pentangular in outline, and upon which the arms bifurcate, which are composed of a single series of joints with parallel sutures ; arms not large, and apparently ten in number.

Surface smooth, or finely granulose.

Four specimens, more or less perfect, of this species have been discovered, presenting very constant characters.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Cabinets of B. J. Hall, Esq., and Rev. W. H. Barris.

Genus Actinocrinus Miller.

Actinocrinus quadrispinus (n. s.) Body small, flat below, the rays passing out horizontally ; basal plates nearly as large as the first radials, slightly depressed in the centre for the attachment of the column ; first radials hexagonal and heptagonal, wider than long ; second radials a little shorter than the first, but reaching the outer part of the body, and much bent upward at the sides to meet the inter-radial plates, and to conform to the convexity of the under side of the projecting part of the rays, which are broken off in our specimen ; inter-radial series consisting of three plates, the largest below which is hexagonal, and supports the other two ; anal series consisting of seven plates, the first about the size of the first radials, the others smaller, in two arching rows of three abreast. Dome much elevated, composed of very numerous small plates, and surmounted by a strong, tumid plate at the apex, which is surrounded by four adjacent, short, strong, diverging spines, situated directly over each inter-radial space, and by a comparatively large proboscis which passes up from the anal side, all of which adjoin the summit plate ; the anal space and proboscis being proportionally broad, the spines occupy but little more than the anterior half of the summit of the dome.

This species approaches *A. planobasalis* and *A. inflatus* of Hall, but differs from them in its general form, the arrangement of the plates, the four summit spines and side proboscis.

Locality and position, in the lower division of the Burlington Limestone, Burlington, Iowa. — Collection of Mr. Charles Wachsmuth.

Actinocrinus Wachsmuthi * (n. s.) Body somewhat pentalobate in outline at the arm bases ; broadly spreading from the base, which is small ; basal plates rather short, but projecting downward, forming a rim around the column, which is notched at the sutures ; cicatrix for

* Mr. Charles Wachsmuth, Burlington, Iowa.

the attachment of the column small, about half the diameter of the cavity formed by the projecting rim; first radial plates moderately large, each having a prominent node occupying a large portion of the surface of each, as also of the first anal plate; second radials short, about twice as wide as high; third radials a little larger than the second, and supporting one brachial plate on each of their upper sloping sides, and they, in their turn, supporting two arms each, giving the arm formula $\genfrac{}{}{0pt}{}{4}{\frac{4\;4}{4\;4}}=20$ arms. A more or less prominent ridge runs along the centre of each ray from the nodes of the first radials, which bifurcate on the third radials, and again on each brachial plate, passing off to the base of each arm. Anal series, five; inter-radial series, three; the lower one, which is the largest, is somewhat tumid, forming a centre around which the radial ridges diverge. Dome about as high as the depth of the body below the arms, covered by numerous tumid plates, and surmounted by a central proboscis.

This species somewhat resembles *A. rusticus* of Hall, with which it is associated, but differs from that species in its more compact and less pentalobate form, the number of arms to each ray, the arrangement of the plates, and the surface-marking.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Collections of Mr. Charles Wachsmuth and Rev. W. H. Barris.

Actinocrinus Nashvillæ Troost, var. *subtractus*. The upper division of the Burlington Limestone, at Burlington, furnishes an *Actinocrinus* which has the general appearance, and answers the description, of *A. Nashvillæ* (Troost), as given by Prof. Hall, in the Iowa Reports, from the Keokuk Limestone, except that it generally lacks the supra-interradials, one only appearing in the only perfect specimen discovered, which is on the right postero-lateral ray, this position indicating an irregularity. Another specimen shows a single supra-interradial; but the specimen is too imperfect to determine to which ray it belongs. This slight or non-development of supra-interradials is not regarded of specific importance, although the form and appearance are thereby considerably modified. — My own collection and that of Mr. Charles Wachsmuth.

Genus Megistocrinus Owen and Shumard.

Megistocrinus plenus (n. s.) Body subglobose, a little broader than high, base rather narrow, somewhat regularly rounded; basal plate prominent, extending considerably below the first radials; cicatrix, for the attachment of the column rather large, slightly concave, from the margin of which the plate is bevelled abruptly to the sutures between it and the first radials; first radials hexagonal, a little wider than high; second radials smaller than the first, about as wide as high; third radials about as large as the second, having upon each of their upper sloping sides three supra-radials, and upon these the thin, broad brachials rest which complete the edge of the calyx; the arms bifurcating at about their point of junction with the body. Dome broadly convex, composed of numerous small, tumid plates. Inter-radial series consisting of about fourteen plates; anal series twenty or more. Surface granulose-? with distinct grooves at the sutures of the body plates.

From *M. Evansi* and *M. crassus*, it may be distinguished by its convex base, prominent basal plate, channeled sutures, and the proportion of the body plates.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Cabinet of Mr. Charles Wachsmuth.

MEGISTOCRINUS CRASSUS (n. s.) Body large, plates massive, base rather broad, much depressed; basal plate thick, articulating facet of the column large, slightly concave, from near the margin of which the plate is abruptly bevelled to the sutures between it and the first radials; first radials very massive, much elevated from the general surface, with nearly perpendicular sides, leaving deep channels at the sutures, somewhat regularly hexagonal, with the longest side adjoining the basal plate, a little wider than high, with a few very coarse, irregular corrugations on their upper surfaces; second radials hexagonal, about as wide as high, widest above, not so large and thick as the first radials, tumid in the centre; third radials about half as large as the second, wider than high, much convex. All the plates of the lower part of the body are very thick, and have their sides sloping abruptly to the sutures, while higher up they are more or less regularly convex to the sutures. This species is readily distinguished by its extremely massive plates and deep sutures.

Locality and position, in the lower division of the Burlington Limestone, Burlington, Iowa. — Collection of Mr. Charles Wachsmuth.

Genus PLATYCRINUS Miller.

PLATYCRINUS PLEUROVIMENUS (n. s.) Body broadly cup-shaped, with broad bevelled depressions at the sutures; dome elevated, and covered with numerous tumid plates; basal plates anchylosed, forming a broad, pentagonal, concavo-convex disc, with a moderately deep depression in the centre, in which is sometimes observed a still deeper, nearly circular excavation for the attachment of the column; a broad groove marks the line of the sutures, but does not extend quite to the margin. An incipient ridge runs from the inner margin of the central depression to each of the angles of the disc; first radials massive, about one-quarter wider than high, the sides of which extend with an obtuse angle above the articulating arm-facet. This is quite prominent, subcircular, occupying about one-third of the width of the plate, with a narrow, deep notch in the centre of the upper sides; surface of the broad bevelled edges of the plates marked by parallel ridges, and the surface between these and the articulating facet faintly and coarsely corrugated. Arms strong, broadly rounded on the back, bifurcating upon the second radial, yet not separating from each other immediately, but continued as a compound arm, composed of three pairs of strong plates which gradually increase in width, and abut obliquely against each other by their inner edges, except the third pair, which abut by only about one-half their height, and from which the arms diverge, being composed of fourteen or fifteen other plates, broad and strong, extending clear across the back of the arm, with straight or slightly oblique sutures, the articulating faces of which are crenulated. Beyond this, they bifurcate again. A series of small plates arch over the upper side of the arms, from the sides of which numerous armlets diverge, which bear the tentacles, and are composed of a double series of plates like the usual simple arms of Platycrinus.

Column subcircular at the upper ends, but rapidly assuming a twisted, oval form, and composed of thin joints, gradually increasing in thickness from the body. This species is probably the same to which the large plates belonged which Messrs. Owen and Shumard referred to their *P. discoideus*, and may also be the same as that figured by Prof. Hall in the Iowa Reports, and referred also to *P. discoideus;* yet the latter presents some important differences from our specimens, and, it is not improbable, will prove to be a different species, as separate plates are frequently found, showing this constant variety. I should not question the conclusions of these eminent men, were it not that lately-discovered specimens of *P. discoideus*, as figured and described by Messrs. Owen and Shumard, show the arms to have been simple, like those of *P. Shumardianus*, *P. Wortheni*, &c., as seen figured in the Iowa Reports, while our species has arms so differently constructed that it may yet be found expedient to consider this difference of generic importance.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — My own cabinet.

PLATYCRINUS QUINQUENODUS (n. s.) Body cup-shaped, spreading above, base truncated, having five distinct nodes situated at the outer margin of the truncation, and directly beneath each perpendicular suture of the first radials; basal plates bent upward at the edges, their slightly concave sides joining the convex ends of the first radials, showing a shallow depression at the sutures; first radials hexagonal in outline, slightly convex, a little depressed at the sutures; articulating arm-facet shallow, or nearly flat, subtriangular in outline; arms bifurcating upon the second radials, which are short, but cover the whole facet of the first radials, and are continued as a compound arm by two pairs of short, strong arm-plates, abutting each other by their inner sides, upon the last pair of which the arms again bifurcate; a high, narrow, tumid interradial plate rests in each of the retreating angles, formed by the upper slopes of the first radials, against which the dome-plates and those which arch over the compound arms abut; these latter plates are tumid or subspinose. Anal series consisting of one rather large plate resting in the angle between the first radials, which is surmounted by numerous small plates surrounding the anal opening, which is situated about half way between the first radials and the summit of the dome.

This species resembles *P. pileatus* of Goldfuss, as figured by De Koninck and Le Hon, in "*Recherches sur les Crinoïds du Terrain Carbonifère de la Belgique*," Pl. VI., fig. 3, but differs in the truncated and nodose base, the different shape and proportions of the arm-plates and articulating facets of the arms with the first radials.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Collection of Mr. Charles Wachsmuth.

Genus Dichocrinus Munster.

Dichocrinus angustus (n. s.) Body rather small, about twice as high as wide, in the form of a narrow, slightly truncated cone; basal plates higher than the diameter at their junction with the first radials, sloping direct to the column, which is small and round; first radials and anal plates of about the same size, nearly twice as high as wide; the anterior first radial and first anal plates a little widest below; arm-facets occupying the greater part of the width of the first radials, very slightly excavated and narrow; second and third radials short, with two indistinct nodes abreast on each; arms bifurcating on the third radial, and continued by two short plates, which are also indistinctly nodose to the second bifurcation, beyond which the arms are composed of a single series of small plates with slightly oblique sutures. Surface apparently smooth.

This species differs from *D. scitulus* of Hall in its much greater proportionate length, with its plates differently proportioned; the place of attachment of the column is round, and not protuberant and oval, as in that species. It is the smallest described species in these rocks except *D. pocillum.*

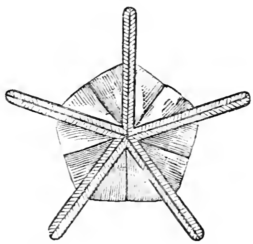
Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Collections of Mr. Barris and Mr. Wachsmuth.

Dichocrinus crassitestus (n. s.) Body obconical, spreading with gentle curves to the arms, about one-third higher than wide; base about one-third the height of the body, truncated and slightly excavated for the attachment of the column which is round and moderately small; lateral first radials about twice as high as wide, sides nearly parallel, or a little narrower at the lower ends, which are slightly rounded; anal and anterior first radial plates wider below than above, their lower ends angular, fitting into the retreating angles at the sutures of the base; arm-facets shallow, narrow, and occupy the greater part of the width of the plates; second radials *very* short, scarcely reaching so high as the tops of the first radials; third radials also very short; upon these the arms rest, being composed of two short plates, each, when they bifurcate, and are continued to the ends by a single series of short plates with parallel sutures, giving twenty arms in all, which are about twice the length of the body, and very small. A strong proboscis extends far up within the arms, based upon the large anal plate. Plates of the body smooth, or finely granulose.

This species differs from all others with which it is associated in the thickness of its plates; other marked peculiarities are its small arms, very short second and third radials, and strong proboscis.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Collections of Rev. W. H. Barris and Mr. Charles Wachsmuth.

Fig. 3.



PENTREMITES SIRIUS (*summit view*) twice enlarged.

Genus PENTREMITES Say.

PENTREMITES SIRIUS (n. s.) Body depressed turbinate, pentagonal in outline, looking down on the summit, which is broadly convex to the sides, from which it slopes abruptly to the base; this is narrow, and has a small truncation for the attachment of the column; basal plates proportionally high; radials longer than wide, but are much bent, following the shape of the body; ambulacrals are as narrow, extending outward from the body in a horizontal direction, their full length from the summit being about equal to the transverse diameter of the body, leaving about half of their length projecting from the sides, and are supported by a narrow process, which is about twice as deep as the width of the area, becoming somewhat pointed at the ends. Poral plates numerous, situated obliquely to the direction of the area; median furrow distinct; outer margins of the area very narrow. Interradial plates and summit openings unknown.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa. — Collections of Rev. W. H. Barris and Mr. Wachsmuth.

MOLLUSCA.

GASTEROPODA.

Genus PORCELLIA Leveille.

PORCELLIA OBLIQUINODA (n. s.) Shell broadly umbilicate, volutions contiguous; a row of numerous, moderately raised, oblique nodes running along each side of the shell a little nearest the back, giving it a somewhat angular appearance there, from which point the shell is regularly rounded on the back, and sloping with a curve to the next inner volution. A distinct linear depression runs along the back of the shell. The oblique position of the nodes, and the direction of some faint striæ of growth, seem to indicate that the dorsal notch was broadly V-shaped. Our specimen is a fine sandstone cast, preserving about three volutions and the matrix of part of another; the full number was probably four or five.

From *P. nodosa* Hall and *P. crassinoda* White and Whitfield, the only other described species of this genus known to us in the American rocks, it differs in the shape, size, and number of the nodes, and the general proportions of the shell.

Locality and position, in the sandstone of the Chemung beds at Burlington, Iowa.

Genus BELLEROPHON Montfort.

BELLEROPHON PANNEUS (n. s.) Shell subglobose, gradually expanding, except at the lateral margins, where it expands abruptly; transverse section of the volution opposite the aperture an irregular ellipse; umbilici narrow and deep, which, when not filled with the imbedding material, display the rounded sides of the volutions, which are three or more in number. The back of the shell is somewhat flattened, and has a central longitudinal elevation, which becomes a distinct carina at the front; surface marked by strong, irregular, undulating lines of growth, becoming very rough towards the front margin.

Locality and position, in the Chemung beds, at Burlington, Iowa.

BELLEROPHON SCRIPTIFERUS (n. s.) Body of shell rather small; volutions few, rounded, closely coiled; cross section elliptical; umbilici small, rather deep; last volution extremely expanded into a broad subheart-shaped disc, the back margin not reaching quite so far back as the body of the shell, and rounding gradually in on each side to meet it. A narrow carina runs along the back of the shell, which is quite distinct at the front, but farther back it is hardly perceptible; front margin emarginate, and the fine striæ of growth, which are more or less visible on the front of the shell, bend gently back to meet the carina. A few very faint longitudinal ridges are observed on each side of the back of the shell, running out upon the expanded disc.

This species bears a close resemblance to *B. patulus* Hall, of the Hamilton group of New York, but it differs in the deeper umbilicus, the general outline of the margin, and its strong carina.

Locality and position, in the Chemung beds, at Burlington, Iowa.

Genus Euomphalus Sowerby.

Euomphalus roberti * (n. s.) Shell discoid, of moderate size; volutions three or more, which gradually enlarge from the apex; aperture subovoid, or subcircular, its diameter twice that of the adjacent whorl at that point; umbilicus shallow; spire umbilicate; a strong carina running along the upper side of the shell, from which it is regularly rounded on the outer and under sides of the adjacent whorl in the umbilicus. Inside sloping with a slight concavo-convex curve from the carina to the adjacent whorl in the spiral depression. Surface marked by the usual lines of growth.

This species closely resembles *E. pentangulatus* Sowerby, the type of the genus, but differs in the less angular outline of the aperture, the greater depression of the spire, and the more rapid increase in the size of the volutions.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa.

Pteropoda.

Genus Conularia Miller.

Conularia byblis (n. s.) Shell large, in the shape of a truncated pyramid, length twice ? the width of the base; apex broadly-rounded, smooth, sides depressed, convex; grooves at the angles narrow; a faint longitudinal depression along the middle of each side; transverse ridges narrow, distinctly raised, forty-five or fifty to the inch, but slightly curved in passing from the salient angles to the faint central depression, at which they meet with an obtuse angle and cross with slight interruption; sometimes, however, they alternate for a short distance, and then cross continuously as before. Spaces between the ridges finely crenulate.

Locality and position, in the Chemung beds at Burlington, Iowa.

Conularia victa (n. s.) Shell of moderate size, gradually sloping

* Prof. Jos. T. Robert, Burlington University, Burlington, Iowa.

from the base; transverse ridges forty-five or fifty to the inch, finely nodose, sweeping downward with gentle curves to the central depression, where they meet with a very obtuse, rounded angle, and cross with little interruption, except where they slightly alternate; spaces between them smooth; grooves at the salient angles distinct, at which the ends of the transverse ridges regularly alternate, having a small pit at the end of each, giving the appearance of a finely-stitched suture.

Partially decomposed fragments of this species have been observed in small concretionary masses, having the appearance of coprolites, indicating the probability that they were the victims of the fishes whose remains are frequently found in the same strata.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa.

BRACHIOPODA.

Genus RHYNCHONELLA Fischer.

RHYNCHONELLA CAPUT TESTUDINIS (n. s.) Shell large, subtriangular, subcuneate, front rather fully rounded, meeting the lateral slopes at an obtuse angle; sides somewhat concave, free from plications near the beaks, and sloping to them with gentle incurvatures, giving the shell an angular appearance about the beaks, which are small, and at which the sides meet at an acute angle; both valves regularly and nearly equally convex; dorsal beak closely incurved beneath the ventral beak, which is slightly incurved. Foramen and deltidium unknown. Surface marked by from sixteen to eighteen distinct, somewhat rounded plications on each valve, which mostly reach the beak with some distinctness, but are occasionally increased, both by implantation and bifurcation. These are traversed by fine radiating lines, and crossed by fine concentric lines of growth.

Mesial fold and sinus scarcely defined, but the front is slightly emarginate in the older specimens, by the elevation of the lingual extension of the lower valve with a gradual curve, which includes five or six of the plications.

Locality and position, at the base of the Burlington Limestone, Burlington, Iowa.

RHYNCHONELLA OTTUMWA (n. s.) Shell rather small, variable in form, somewhat triangular, subpentagonal or subovoid in outline; valves subequally convex; ventral valve regularly convex along the centre from beak to front, broadly convex across the centre from side to side; beak rather large, long, projecting much backward, pointed, and curving upward with rather more than the regular curvature of the valve, the space beneath it a little flattened, giving somewhat the appearance of an area; deltidial plates occupying a rather large, equilateral triangular space, with a moderately large, oval foramen. Dorsal valve broadly convex, beak broad, closely incurved, umbonal parts a little flattened.

Surface marked by eight or ten simple, somewhat angular plications, which are visible only on the front part of the shell; two of these are depressed on the ventral valve for the mesial sinus, the tongue of which, in the older specimens, is considerably elevated; the mesial fold has three plications, and is slightly elevated at the front; the plications on each side of the mesial fold and sinus are usually indistinct. Nearly half the length of the shell from the beaks is free from plications, and only marked by fine concentric lines of growth, so that the half-grown specimens present very little appearance of a plicated shell. Shell structure distinctly fibrous.

Locality and position, in the St. Louis Limestone at Ottumwa, and near Oskaloosa, Iowa.

Genus SPIRIFER Sowerby.

SPIRIFER GLANS CERASUS (n. s.) Shell very small, globose, subcircular in outline, front border slightly emarginate, hinge line less than the width of the shell; ventral valve with a rather broad, faintly-impressed sinus; beak high, arcuate, incurved; area narrow, indistinctly defined; foramen about as wide as high. Dorsal valve somewhat regularly convex, without a distinct mesial fold; umbo rather prominent; beak small, prominent, and projecting a little back of the hinge line. Surface marked by concentric lines of growth, but no radiating striæ, or ribs, have been observed.

This species is of the type of *S. lineatus* of Martin, but differs from that species, as identified in our Coal Measures, by its more circular and globose form, shorter ventral beak, and less convex dorsal valve. From the young of *S. dubius* of Hall, with which it is associated, it differs in its much more globose and circular form, higher area, and more prominent ventral beak.

Locality and position, in limestone of the age of the Hamilton group of New York, Iowa City, Iowa.

OBSERVATIONS ON THE

Genus SPIRIFERINA D'Orbigny.

In the Chemung and lower carboniferous rocks of the West, are several species of shells which have been referred to the genus *Spirifer*, which probably ought to be referred to *Spiriferina*. One of these, *S. spinosa* of Norwood and Pratten, possesses all the characters of *Spiriferina*, — the punctate structure, spinulose surface, pseudo-deltidium, and internal septum, — and was referred to that genus by Prof. Hall, in 1856. *Spirifer solidirostris* White has the punctate structure, internal septum and pseudo-deltidium of *Spiriferina*, but is not spinulose. *Spiriferina? subtexta*, herein described, has the internal septum and punctate structure, but our specimens do not show the pseudo-deltidium, and the species is destitute of spines. A single ventral valve from the Lithographic Limestone of Clarkesville, Mo., probably referable to the latter species, shows the interior septum, but no other definite character of *Spiriferina*.

The punctate structure of the shell in all these species is coarser than is usual in *Terebratula Retzia*, &c., and is hardly distinguishable, except in weathered and exfoliated conditions. The outer layer, and lamellæ, appear not to possess this character, and to hide that of the substance beneath, so that it does not appear in the better preserved specimens. The pseudo-deltidium might easily have been removed from *S. subtexta*, while *S. solidirostris* is known to possess it. Thus these two species, doubtless, possessed all the characters of *Spiriferina*, except the spinulose surface; and, as this latter character is considered of only specific importance in some other genera, these two species are referred with a query to that genus.

SPIRIFERINA? SUBTEXTA (n. s.) Shell rather small, subglobose, hinge line varying in length from less than the width to the greatest width of the shell. Dorsal valve subsemicircular in outline, somewhat regularly convex, umbonal parts rather prominent, beak small, incurved over the hinge line. Ventral valve deeper than the other, arcuate from beak to front, area large, not distinctly defined on its upper margins; foramen narrow, reaching to the beak, which is acute, and incurved; five or six prominent plications on each side of the mesial fold and sinus; sinus moderately large, distinctly defined to the beak; mesial fold scarcely raised above the general convexity of the shell except at the front; the ribs bordering the sinus, and the depressions bordering the mesial fold, larger than the others.

Surface marked by fine concentric lamellæ of growth, which are most conspicuous near the front margins. Shell structure conspicuously punctate, when exfoliated or much weathered.

This species most nearly resembles *Spirifer (Spiriferina?) solidirostris* White, but differs in its more globose form, less number of ribs, higher area, and having its foramen open to the beak.

Locality and position, in the upper and lower divisions of the Burlington Limestone, Burlington, Iowa.

Genus CYRTIA Dalman.

CYRTIA CURVILINEATA (n. s.) Shell rather small, greatest width forward of the hinge line; ventral valve much elevated; beak small, more or less incurved, and pointing backward beyond the cardinal border; the sloping sides of the area about equalling the length of the hinge line; deltidium forming an elliptic arch over the foramen, which is narrow, and slightly open at the base; nine or ten simple, rounded plications on each side of the sinus, which is shallow, and contains two slightly raised plications. Dorsal valve subelliptical in outline, depressed convex, a little flattened at the cardinal extremities; eight or nine plications on each side of the mesial fold, which is very slightly elevated, and contains three plications, which are a little larger than the others, the middle one being the largest, and sometimes a little flattened near the front. The front border of the mesial fold in the older shells is bent abruptly upward, giving an emarginate appearance to the front of the shell.

The plicated mesial fold and sinus, the subelliptical outline of the dorsal valve, and the pointing obliquely backward of the beak of the ventral valve, are the more prominent features of this species, and by which it may be readily distinguished.

Genus AMBOCŒLIA Hall.

AMBOCŒLIA (SPIRIFER ?) MINUTA (n. s.) Shell very small; hinge line a little shorter than its greatest width; outline of dorsal valve subcircular, depressed convex, most elevated near the umbo, flattened at the front margin; beak small, projecting a little back of the hinge line; ventral valve much elevated, arcuate; beak broad, obtuse, incurved; foramen about as wide as high, its sides sloping with a slight outward curve; area indistinctly defined. Surface covered with numerous fine setæ, which, when removed, leave a pustulose appearance to the surface, yet the shell structure appears to be fibrous.

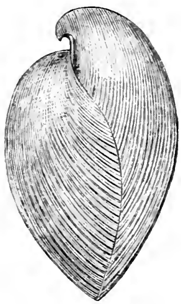
I have not seen a specimen of this species exceeding a line in transverse diameter.

Locality and position, in limestone equivalent to the Chemung beds at Burlington, Hamburg, Ill., and Hannibal, Mo.

I am indebted to B. J. Hall, Esq., of Burlington, Iowa, for a single specimen of a shell, the only one I have seen, except some fragments, which cannot be satisfactorily referred to any established genus, and for which I propose the generic name of *Acambona*. The figures accompanying the generic description are restorations only in part of the outline, as the specimen has been somewhat eroded, but fortunately preserves every external generic character, besides showing one of the internal spires. Following the specific description of this shell, is the specific description of another, which may prove to belong to this genus, when more perfect specimens have been obtained. My cabinet also contains a fragment, specifically different from either of these, which must either be referred to *Retzia*, or to the genus proposed.

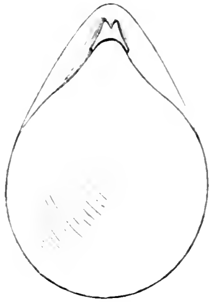
All these are from the rocks at Burlington, Iowa.

Fig. 1.



Acambona prima,
(side view.)

Fig. 2.



Acambona prima,
(dorsal view.)

Genus Acambona (n. g.)

'Ακη, a point; Αμβων, umbo.

Generic description.

Shell of the general appearance and surface characters of *Retzia;* furnished with internal spires, pointing outward and downward (?). Beak of ventral valve prominent, incurved, pointed; area emarginate in front, or V-shaped, reaching to the point of the beak, and extending forward of the beak of the dorsal valve on each side of it. Beak of the dorsal valve closely incurved, filling, or nearly filling, the forked space or emargination in the front part of the area, being itself without angular, winged extensions, or area, to meet that of the opposite valve.

Shell structure punctate.

The punctate structure and internal spires fully separate this genus from all the *Rhynchonellidæ;* its punctate structure, curved hinge line, and general form, separate it from the usual forms of the *Spirifidæ;* from *Retzia*, which it most resembles, it differs in having a pointed ventral beak, curved hinge line, and no angular cardinal wings on the dorsal valve; from *Uncites* it differs in having an area and punctate structure; from *Trematospira* it differs in its pointed ventral beak and true area; and from *Stringocephalus*, in its internal spires, gibbous dorsal valve, proportionally small area, and want of ventral septum.

Acambona prima (n. s.) Shell ovate in outline, regularly rounded in front; dorsal valve most convex; beak somewhat narrow, closely incurved; beak of ventral valve prominent, strongly incurved and sharply pointed; area small, distance across the forward points about the same as from the apex to the points, distinctly defined, with a flange-like projecting border on each side, and presenting a neatly-curved outline, as seen in profile. Surface marked by strong lines of growth near the front, and by numerous, rounded, slightly raised costæ, which become indistinct on the upper part of the shell, particularly on the ventral beak, at the sides, — on the former, scarcely appearing at all, and on the latter assuming the character of fine striæ.

Locality and position, in the lower division of the Burlington Limestone, Burlington, Iowa.

Genus RETZIA King. ACAMBONA Mihi.

RETZIA (ACAMBONA ?) ALTIROSTRIS (n. s.) Shell sub-ovoid in outline, valves nearly equally convex. Dorsal valve most convex near the umbo; beak prominent, small; beak of ventral valve strong, much elevated, incurved. Area about as high as wide.

Surface marked by from twenty to twenty-two prominent, simple, rounded ribs on each valve, which gradually enlarge towards the front, the spaces between which are narrower than the ribs, the central one on the ventral valve being a little wider than the rest, and giving the appearance of a faint, narrow, mesial sinus; the rib on the other valve, immediately opposite, is also a little broader than the rest, but scarcely raised above them. The only specimens obtained are casts in fine-grained sandstone; two of these seem to show indications of an apical foramen, yet the direction of the incipient costæ on the ventral beak would seem to lead to the conclusion that it was pointed. This, with the great elevation of the ventral beak, the outline of the area, and its apparent extension forward of the dorsal beak, renders it not improbable that this species properly belongs to the genus *Acambona*.

Locality and position, in the sandstone of the Chemung beds at Burlington, Iowa.

Genus STREPTORHYNCHUS King.

STREPTORHYNCHUS LENS (n. s.) Shell broadly subelliptical, a little wider than long; hinge line not quite equalling the greatest width of the shell, but sometimes extended outward, forming salient angles at the cardinal extremities; valves subequally convex, the ventral valve deepest, somewhat regularly convex; beak prominent, usually incurved, and not twisted or flattened; area rather narrow, extending fully to the cardinal extremities; height of the callosity a little less than the breadth of its base; dorsal valve a little flattened at the cardinal extremities, usually having a slight central depression, producing a slight emargination of the front.

Surface marked by numerous, abruptly raised, somewhat rugose, rounded striæ, which are frequently increased by implantation; these are crossed by fine concentric striæ and imbricating lines of growth, the latter being numerous near the margin in the older shells.

This species presents all the characters of *Streptorhynchus*, except that the ventral beak is not distorted in any of the specimens examined, as is usual in this genus. This peculiarity, with the sub-lenticular form of adult shells, which is also unusual in species of this genus, renders it comparatively easy to distinguish it.

Locality and position, in limestone of the age of the Chemung beds at Burlington, Clarkesville, Mo., and Hamburg, Ill.

Genus PRODUCTUS Sowerby.

PRODUCTUS VIMINALIS (n. s.) Shell moderately large, thin; ventral valve much elevated in front, where it is about as wide as its length, broadly rounded in front, from which it is somewhat regularly arcuate at the beak; this is rather small, prominent, and incurved; hinge line equalling, or nearly equalling, the greatest width of the shell. Surface marked by numerous, somewhat rugose, tubular costæ, showing the bases of tubular spines on their backs, which are more numerous near the front and at the sides; near the front margin the costæ branch off into prominent, rough, irregular fascicles. The costæ are crossed by fine striæ of growth, and a few more or less distinct concentric undulations.

Locality and position, in the upper division of the Burlington Limestone, Burlington, Iowa.

Genus CHONETES Fischer.

CHONETES GENICULATA (n. s.) Shell small, sub-oval in outline; hinge line scarcely equal to the greatest width; dorsal valve moderately concave, a little flattened at the cardinal extremities, not closely following the curvature of the ventral valve, which in the older specimens is very geniculate near the umbo, the beak being small, and the umbonal parts flattened. Area narrow, slightly concave; that of the ventral valve about twice the width of the other, having about three small spines along its outer margin, on each side of the beak; deltidial callosity about as wide as high. Surface marked by about forty-five or fifty slightly elevated, rounded striæ, which are crossed by fine lines of growth.

Locality and position, in the Chemung beds at Burlington, Iowa (?), and their equivalents at Hamburg, Ill., and Clarkesville, Mo.

Genus CRANIA Retzius.

CRANIA SHELDONI* (n. s.) Dorsal valve circular or subcircular in outline, irregularly convex; beak somewhat elevated, smooth,

* Prof. D. S. Sheldon, Griswold College, Davenport, Iowa.

inclined backward, and situated near the posterior margin. Surface marked by numerous distinct, fine, somewhat rugose striæ. Ventral valve unknown.

This species bears some resemblance to *C. crenistriata* Hall, of the Hamilton group of New York, but is distinct from that in the character of the striæ, the convexity of the ventral valve, and the position of its beak.

Locality and position, in Calcareous Shales of the age of the Hamilton group of New York, New Buffalo, and Iowa City, Iowa.

CRANIA REPOSITA (n. s.) Shell varying from subcircular or subelliptical to transversely subquadrate in outline; interior of ventral or attached valve having a narrow, continuous elevation around the margin; adductor muscular impressions distinctly elevated, the anterior pair close together, and situated a little back of the centre; the posterior pair situated near the posterior margin, and about as far apart as their distance from the anterior pair.

The only specimens of this species discovered are attached, by the full breadth of the ventral valve,—the dorsal valve absent,—to a valve of *Spirifer Grimesi.*

Genus DISCINA Lamark.

DISCINA CAPAX (n. s.) Shell subcircular in outline, dorsal valve much convex, apex small, prominent, eccentric, and pointing backwards. Surface having a rather smooth appearance, but marked by fine lines of growth, and these crossed by very faint, somewhat distinct, radiating striæ.

This species bears some resemblance to *D. Vanuxemi*, Hall, of the Lower Helderberg group of New York, but differs in the more eccentric position of the apex and the character of the surface-markings.

Locality and position, in the sandstone of the Chemung beds at Burlington, Iowa.

Genus LINGULA Bruguière.

LINGULA HALLI* (n. s.) Shell elongate, oval in outline, about twice as long as wide; valves not very gibbous; beaks small, prominent. Surface marked by fine striæ of growth; yet its appearance is usually smooth and bright.

It most nearly resembles *L. Spatula* Hall, of the Genessee Slate of New York, but differs in being proportionally shorter, and narrower near the beaks, and has a smoother surface.

Locality and position, in the upper and lower divisions of the Burlington Limestone, Burlington, Iowa.

*B. J. Hall, Esq., Burlington, Iowa.

CONCHIFERA.

Genus AVICULOPECTEN McCoy.

AVICULOPECTEN GRADOCOSTUS (n. s.) Shell large, a little inequilateral, broader than high; left valve rather flat; right valve more convex; umbones large, prominent, shell on the anterior slope bending abruptly down to the anterior wing, which is faintly radiated. Hinge line and full length of wings unknown. Surface marked by about twenty-five broad, flat, compound ribs on the body of each valve, which are well developed near the basal margin, but more indistinct on the umbones and slopes. These ribs are separated by a narrow groove, and surmounted by a distinct carina of about the same width as the groove, giving the sides of the ribs somewhat the appearance of minute steps.

Locality and position, in the sandstone of the Chemung beds at Burlington, Iowa.

Genus CARDIOMORPHA DeKonnick, CARDIOPSIS Meek and Worthen.

CARDIOMORPHA (CARDIOPSIS ?) PARVIROSTRIS. Shell subcircular in outline, slightly inequilateral; valves broadly and moderately convex; base more broadly rounded than the front and oval margins; beaks small, incurved, pointing little, if any, forward. Surface marked by fine radiating lines.

This species is associated with C. *ovata* Hall, which Messrs. Meek and Worthen regard as belonging to their genus *Cardiopsis*. If so, our species should probably be referred to the same genus. It differs specifically from that shell in its less oblique and more circular outline, its much smaller umbones, and less incurved and deflected beaks.

Genus GERVILLIA Defrance.

GERVILLIA STRIGOSA (n. s.) Shell long and very narrow, posterior end abruptly rounded, back slightly concave, base a little more convex than the concavity of the back, most ventricose a little behind the umbones, one or two faint ridges running along the back on each side; anterior ear rounded at the front end, inflated, leaving an oblique depression between it and the body of the shell, which reaches the base, making it a little emarginate; posterior ear small, and but slightly elevated from the back of the shell. Surface marked by a few concentric wrinkles, more visible on the anterior parts. Length 4, height 1.

Locality and position, in the Chemung beds at Burlington, Iowa.

ZOOPHYTA.

Genus ZAPHRENTIS Rafinesque et Clifford.

ZAPHRENTIS ELLIPTICA (n. s.) Coral in the form of an elongated, reversed cone, curved and laterally compressed, more so below than at the upper part; sometimes this compression is so great as to produce a strong carina on the outer curve below, and to give a subelliptical outline to the calyx. Septal fossette rather large, but variable in size, extending to the outer wall on the incurved side, where it is deepest. Radiating lamellæ strongly defined, somewhat slightly and irregularly curved, numbering at the margin from thirty-two to forty, occasionally uniting in fascicles; outer wall thin. Surface marked by the usual lines of growth.

Locality and position, in the lower division of the Burlington Limestone, Burlington, Iowa.

ZAPHRENTIS GLANS (n. s.) Coral small, general form subglobose; apex small, prominent; border of the calyx very oblique; radiating lamellæ well developed, usually extending above the outer border so as to make the top convex instead of concave, as is usual in this genus. They are from thirty to forty in number besides partially developed ones alternating with those well developed. Septal fossette moderately large, but shallow, extending to the outer wall on the outer or most convex side, and deepest near its centre. Outer wall thin, and marked by undulating lines of growth.

Locality and position, in the upper bed of Burlington Limestone, Burlington, Iowa; where it is frequently met with in a water-worn or eroded condition, giving it a glandular shape.

Genus SYRINGOPORA Goldfuss.

SYRINGOPORA HARVEYI * (n. s.) Tubes flexuous, round, usually somewhat radiating, rather closely arranged, connected by not very numerous, rather strong side tubules, and sometimes coalescing; funnel-shaped prolifers rather numerous, deep, thin. Surface of tubes marked by somewhat strong wrinkles of growth.

Locality and position, in the Chemung beds, and the lower division of the Burlington Limestone, Burlington, Iowa.

Genus STRIATOPORA Hall.

STRIATOPORA CARBONARIA (n. s.) Coral ramose, very gradually tapering; cells deep, closely arranged in alternating series opening upward; walls thin and somewhat projecting on the lower margins. The general characters of this species seem to place it without doubt in the genus *Striatopora* of Hall, yet our specimens do not show the interior striation of the cells which is characteristic of that genus; probably on account of their weathered condition, and the probability that they are outer branches, and were not fully matured.

Locality and position, in the upper and lower divisions of the Burlington Limestone, Burlington, Iowa.

* Dr. Philip Harvey, Burlington, Iowa.

Nullipora? obtexta (n. s.) In the Chemung rocks at Burlington, a peculiar incrustation is met with, which appears to possess the characters of *Nullipora*. It usually commences on the convex side of a small shell, completely encrusting it, and apparently permeating its substance, and then flowing out from it on every side in irregular undulations, giving a subcircular outline, and preserving about the same thickness beyond the border of the shell that it has where that forms a part, except at the outer margin of the incrustation, where it is thin. The upper surface is covered with fine, distinct, irregular, granular corrugations, showing undulating wrinkles of growth. Its general aspect is like the upper valve of *Crania*, and when it encrusts an *Orthis*, as it frequently does, the deception is quite complete, as the striation of the shell is not fully obscured by the incrustation, and the beak of the encrusted shell gives the usual appearance of the umbo of *Crania*. They have been observed encrusting the separate valves of *Nucleospira Barrisi*, *Orthis Thiemei*, and *Nucula Iowensis*, all small shells, but the overflowing part has been observed to reach to an inch and a quarter in diameter.

February 5, 1862.

The President in the chair.

A paper was presented in the name of Mr. Charles A. White, of Burlington, Iowa, entitled, "Descriptions of new species of Fossils from the Devonian and Carboniferous rocks of the Mississippi Valley." Referred to the Committee on Publication.

Mr. A. E. Verrill made a report on the coral incrusting the bell, olive jar, and decanter, from the wreck of the frigate Severn, lost in 1793, and presented at the last meeting by Messrs. Sampson and Tappan. It proved to be a species of *Heliastrea*, resembling both *H. stellulata* and *H. annularis* of M. Edwards, but probably distinct from either.

Mr. Marcou read the following communication: —

Observations on the terms "Pénéen," "Permian," and "Dyas." By Jules Marcou.

In an article published simultaneously in three or four English periodical scientific journals,* Sir Roderick Impey Murchison expresses

* See "*On the Inapplicability of the new term 'Dyas' to the 'Permian' Group of Rocks, as proposed by Dr. Geinitz.*" *By Murchison. Edinburgh New Philosophical Journal*, Jan., 1862; *The Geologist*, No. 49, Jan., 1862; *The London, Edinburgh, and Dublin Philosophical Magazine*, Jan., 1862, and also *The Illustrated London News*. Jan., 1862.

himself as follows: "I suggested to my associates (de Verneuil and Von Keyserling), when we were at Moscow in October, 1841, that we should employ the term *Permian* to represent, by one unambiguous geographical term, a varied mineral group, which neither in Germany nor elsewhere had then received one collective name." The author adds, in a foot-note, "It is true that the term *Pénéen* was formerly proposed by my eminent friend, M. d'Omalius d'Halloy; but as that name, meaning *sterile* (M. d'Omalius does not translate *Pénéen* by *sterile*, but by *poor*. — J. M.), was taken from an insulated mass of conglomerate near Malmédy in Belgium, in which nothing organic was ever discovered, it was manifest that it could not be continued in use, as applied to a group which was rich in animal and vegetable productions."

After stating the reasons which, according to his view, show the "inapplicability of the new term Dyas," Mr. Murchison adds: — "I claim no other merit on this point for my colleagues de Verneuil and Von Keyserling, and myself, than that of having propounded, twenty years ago, the name of "Permian," to embrace in one natural series those subformations for which no collective name had been adopted. I trust that, in accordance with those rules of priority which guide naturalists, the word "Permian" will be maintained in geological classification."

In answer to this, I beg geologists to read the following extract: —

"Pénéen Formation. — The formation that we designate by the epithet *pénéen* (poor) has for its principal type the deposits of Thuringia (M. d'Omalius does not mention the conglomerate, near Malmédy, as a principal type. — J. M.), commonly known by the German names, *Zechstein*, *Kupferschiefer*, and *Todtliegende*. The fossils are chiefly the *Paleoniscus*, *Platysomus*, *Pygopterus*, *Spirifer*, etc." . . "Thuringia being the classic ground of the *Pénéen formation*, we shall cite it as the type, etc." (See *Eléments de Géologie*, by J. J. d'Omalius d'Halloy, 3d edition, Paris, 1839; pp. 415–416.)

In the second edition of his *Eléments de Géologie*, published in 1834, M. d'Omalius already uses the term "*Pénéen*" to designate the Zechstein and the Rothliegende.

This settles the question of priority.

1834. — M. d'Omalius unites under the term *Pénéen Formation*, the Zechstein and the Rothliegende.

1839. — M. d'Omalius continues the term *Pénéen*.

1840. — M. Kittel unites the Zechstein and the Rothliegende in one formation. (See *Lehrbuch der Geognosie*, by Naumann.

1842–45. — Mr. Murchison proposes the term "*Permian*" to designate the vast series of beds of marls, schists, limestones, sandstones, and conglomerates, east of the Volga (Russia), which correspond to the whole of the Trias, and also to the upper part only of the *Pénéen*.

1850. — M. Haussman uses the term *Thuringer formation.*
1853. — M. d'Omalius continues the term *Pénéen.*
1854–56. — M. Dumont uses the term *Pénéen.*
1854–59. — Mr. Murchison applies the term *Permian*, with its signification, as a Russian type, to the *Lower New Red Sandstone*, *Magnesian Limestone*, and *marl slate* of England; and also to the *Rothliegende*, *Zechstein*, and *Bunterschiefer*, containing the *Calamites arenaceus* of the Trias of Germany. (*Siluria ;* 2d and 3d edition.)
1859. — M. Marcou shows the objections to the term *Permian*, with its Russian signification, as a type, and proposes the terms, *Saxonian formation*, *Thuringian formation*, *Eislebenien formation*, or " *Dyas.*"
1861. — M. Geinitz publishes the first volume of his monograph of the " *Dyas*," in association with Messrs. Eisel, Ludwig, Reuss, and Richter.
1862. — M. Murchison shows what he calls " the inapplicability " of the terms *Pénéen*, *Dyas*, *Trias*, *Grauwacke.*

My Memoir, *Dyas and Trias* (see *Archives de la Bibliothèque Universelle de Genève*, 1859), treats two questions entirely distinct.

The first and the principal one, since it is a reply to the demand for an explanation which Sir R. I. Murchison did me the honor to address to me, shows the numerous and grave objections which arise from the use of the geographical term " *Permian*," with its signification, as explained by Mr. Murchison, in his work, *Russia in Europe and the Ural Mountains*, 1845, whether it be applied to Russia itself, or Germany, England, Asia, or America.

Mr. Murchison has declined answering these objections, for the reason that " the author had not been in Russia " (see *Silliman's Journal*, 1859, and *Edinburgh New Philosophical Journal*, 1862). One of the associates of Professor Geinitz, M. Ludwig, has been to Russia, and the results of his researches will be published in the 2d volume of the monograph of the " *Dyas.*" Other observers will follow, and, before many years have passed, we shall better understand the Russian Dyas and Trias.

The second question is the union of the Dyas and Trias, as a great geologic period, under the name of " The New Red Sandstone ; " a period which I consider, in time and space, as of the same importance with the Grauwacke or Paleozoic, Carboniferous, Secondary (Jurassic and Cretaceous), Tertiary, and recent periods.

I have never united the New Red Sandstone with the Secondary, or with the Carboniferous.

In order to work out the classification of the stratified rocks into those grand periods, I have made use of all the geological characters of the rocks, — that is, their stratigraphy, paleontology, lithology, orography, and their geographical distribution; and, after all, it is very nearly the same classification as those proposed and employed by Werner, Smith, Brongniart, De la Bêche, De Buch, Humboldt, d'Omalius, and Elie de Beaumont.

Some observers, relying exclusively on Paleontological evidence, and putting aside all other geological characters, have proposed the classification of all the stratified rocks into three or four great periods, under the names of Azoic, Paleozoic (Grauwacke, Carboniferous, and Dyas), and Neozoic (Trias, Jurassic, Cretaceous, Tertiary, and recent,) or Mesozoic (Trias, Jurassic, and Cretaceous), and Cainozoic (Tertiary and recent).

If the class of Molluscs, especially the Brachiopods, and the plants, are alone considered in Paleontology, it is true that, in the *actual state of our knowledge*, the preceding classification is well founded; but if we study also the Radiates, the Echinodermata, the Crustacea, the Fishes, Reptiles, and the Mammalia, to place the Dyas in the Paleozoic is no longer so justifiable, and several learned Paleontologists place the Dyas even in the Mesozoic.

While I understand and respect these different Paleontological classifications, I think that I follow the true principles and methods of natural history in keeping to the ancient classification, as I have learned it in the works of the founders of Geology, and as I have seen it in the two hemispheres.

Mr. Wilder made a verbal communication on the muscular differences existing between the hands and feet of man and those of the Quadrumana, showing, in particular, that though in general appearance and power of grasp the so-called hind-hand of the monkey resembles rather the hand than the foot of man, yet there is this important structural difference, that the great toe of the monkey has no separate long flexor muscle, but its tendon is closely connected with the tendons of the other toes; so that it has little independent motion, but is flexed at the same time with the rest, in the simple act of grasping a branch or other object.

In accordance with a suggestion from the Council, it was voted to establish a Curatorship of Ethnology.

Voted, that a committee be appointed to nominate a candidate for the Curatorship; the President designated Drs. Gould, White, and Kneeland, who nominated Dr. Charles Pickering, and he was unanimously elected.

The Treasurer notified the members present that he should propose an alteration in Article 3d of the Constitution, fixing the sum necessary to make any one a patron of the Society, at one hundred, instead of fifty dollars.

On motion of the Treasurer, the following alterations were made in the By-Laws, as in the printed copy of 1855:

In Section I. Art. 1, the first sentence to end with the word "thereof," in the third line, and the second sentence to be stricken out.

Art. 2. After the word "pay," in the second line of the first sentence, to read "any assessments."

In Section III. Art. 1, to read, "Every resident member shall be subject to an annual assessment of five dollars, payable on the first of October of each year."

Art. 2. "Any member who shall pay into the treasury at one time the sum of fifty dollars, may become a Life Member, and be exempt from the annual assessments."

In Art. 3, in line four, after "inability," to strike out "to become a member should an initiation or assessment fee be demanded," and substitute "to pay the annual assessments."

On behalf of the Building Committee, Dr. White announced that ground had been broken on the site of the Society's new building, preparatory to driving piles, and that some of the materials were upon the ground.

The Corresponding Secretary read the following letters recently received, namely: —

From the K. K. Geologische Reichsanstalt, Wien, September 13th, 1861; the Dublin University Zoological and Botanical Association, November, 1861, acknowledging the receipt of the Society's publications; K. Akademie der Wissenschaften, Wien, October 4th, 1861, acknowledging the same, and asking that some deficiencies may be supplied; Bibliokariat der K. Bayerischen Akademie der Wissenschaften, December 2d, 1861, acknowledging the same, asking for missing numbers, and presenting various publications; K. Preussische Akademie, Berlin, August 31, 1861; Verein für Naturkunde, Wiesbaden, October 1, 1861; Royal University of Norway, Christiania, October 26, 1861; K. Akademie der Wissenschaften, Wien, October 28, 1861, presenting their various publications; Verein für Naturkunde zu Offenbach, July, 1861; Pollichia zu Dürkheim, presenting their publications, and desiring exchange.

Messrs. George Jaques, of Somerville, and John Jeffries, Jr., of Boston, were chosen Resident Members.

February 19, 1862.

The President in the chair.

Mr. C. J. Sprague read the following communication: —

Is the Heath Indigenous to the United States? By C. J. Sprague.

Mr. E. S. Rand, Jr., has contributed an article to the January number of the American Journal of Science, 1862, entitled "The Heather a native of the United States." It is a very clear and precise statement of the facts regarding the recent discovery of Scotch Heath (*Calluna vulgaris*) in Tewksbury, Mass., where it must have been more than fifty years. The evidence obtained inclines Mr. Rand to the belief that the plant was not introduced, but is really indigenous to the country. Notwithstanding the facts stated, we cannot, as yet, come to the same conclusion, which, it appears to us, is based on insufficient evidence.

The vicinity of Boston is notorious for the great number of introduced plants which have become acclimated. Most of these, it is true, are herbs, whose seeds might readily be transported in various ways. The Barberry and the Privet, however, are shrubs. These, although planted by man, have not become extensively spread, being still stragglers on the borders of cultivation. The Heath in question has been found only in one locality, of not more than half an acre in area, and has been confined to that limited area for more than fifty years. It grows in a soil and situation which, instead of being peculiar to that locality, are found throughout the whole breadth of the country. It grows in company with the common Alder and the *Myrica Gale*, which are also European plants, and which are among the commonest of our swamp shrubs. If the Heath be a native plant, there is no reason why it should not be as common as either of these, for there are no peculiar circumstances about this locality which do not exist elsewhere. There are some native plants which are only found in isolated spots; but the cause of this isolation is generally apparent. Many of our Alpine plants are similar to those of Europe; but they are confined, necessarily, to the few localities which are favorable to their growth. On the other hand, some of our trees and shrubs are identical with those of Europe, and, not being circumscribed by peculiar circumstances, grow broadcast over the country. The Chestnut and the Juniper grow everywhere; and there is no reason why the Heath should not, if indigenous, be equally spread. The Rose-Bay (*Rhodôdendron maximum*) and the Magnolia (*Magnolia glauca*) are only found in isolated spots in New England; but they are common Southern plants which gradually thin out northward, and reach their northern limit here. It is climate which prevents their growth. But this is not the case with the Heath. For it is an inhabitant of regions equally cold with ours, and, if it be naturally associated with the Alder, the Cranberry, the Laurel and the Azalea, it ought to be found with them elsewhere, as they exist all over the country in a range of thousands of miles, precisely similar in habit and locality.

Out of sixty-two species of *Ericaceæ* recorded in Dr. Gray's Manual of the Northern States, eighteen are common to Europe; showing that the general circumstances attendant on the growth of plants of this order must be very nearly similar in both places. Of the *Ericineæ* proper, the *Cassandra calyculata*, which grows with the Heath at Tewksbury, a very common New-England plant, is European also. The Bear Berry (*Arctostaphylos Uva-ursi*), very common here, is also European. The *Andromeda polifolia*, a bog plant, also, is common to both countries, as also the *Ledum latifolium*. These instances are mentioned to prove that there can be no natural preventives to the broadcast occurrence of a plant, if native, whose associates are excessively common, and which are also natives of a country where this plant does grow in equal abundance. It would be very strange that in the whole belt of our Northern country, remarkably homogeneous in character, and having a flora almost identical throughout, we should find a native plant growing only on one single half-acre of ground, when there are thousands of acres precisely similar in character everywhere throughout those thousands of miles.

Mr. Rand says: —

"May not this be the last vestige, or one of the last, of what was once an American Heath?" But why must we presuppose that the Heath has died out from the country? Why, when its associates, the Alder, the Cranberry, the Cassandra and the Azalea, are as common as ever, should this one plant, a long-lived, tough, tenacious plant too, have perished? The efforts of man have rarely been exerted to extirpate these plants, because they frequent localities unfavorable to the use of man, and, besides, no necessity has existed for this extirpation.

Let us now examine the facts which have been obtained as to the existence of this Heath. Its occupancy has been traced back fifty years. An old farmer remembers in his boyhood to have seen patches "as big as a bushel basket or larger," of a plant with long, tough roots, which caught the plough. And then it was in precisely the same locality as now, and equally circumscribed. The size of the patches cannot be accurately known. A boy's observation is not very close; and we all know how small the objects appear to our mature eyes which our childish notice thought to be quite grand. Besides this, memory adds compound interest for the time which intervenes, especially when a new-found importance attaches to the principal. Besides this, it is by no means a settled thing that the farmer's boy's plant was *Calluna vulgaris.* Taking Loudon's estimate of the annual growth of heath, "three or four inches a season," or even reducing this to two, twenty years would suffice for a seedling plant to grow forty inches, which would make a respectable bushel basket of branches. So that we need not suppose, with Mr. Rand, that these plants might in Mr. Livingstone's boyhood have been a century old. Neither is Tewksbury such an "out-of-the-way place." Billerica was settled in 1653, and we must not presume that a thickly-settled population is necessary to introduce a foreign plant. One stray seed from the pocket or bundle of a European immigrant may have done it. Many instances have occurred where European plants have been brought over in this way. Foreign plants frequently spring up around paper mills from seeds brought in the rags used there. They do not spread extensively, because the circumstances are not favorable to their acclimation. In the case of the Heath, this is an important point. Because, if native, there is no reason why it should not be broadcast; if it be introduced, there may be nice, unperceived causes why it should not be acclimated here everywhere. The European violet even, common as it is in gardens, has never established itself as an acclimated plant. If our gardeners should sow the Heath everywhere, it might grow where it was sowed, as it has done at Tewksbury, and thoroughly established itself, in spite of harrowing and mowing. This would prove pretty conclusively, that were it a native, it would not have died out, as circumstances would favor its growth as much now as ever. Instances are very rare of an indigenous plant being confined, in any country, to one half an acre of ground.

A whole century and a half elapsed after the settlement of Billerica before the Heath was seen there. The botanico-historic period did not commence for a century and a half after its settlement. How many opportunities might have occurred during that time for the accidental sowing of a foreign heath, when we know that there was constant immigration from Europe, and know, also, that "the seeds retain their vitality for many years."

It is a question of considerable importance, as regards botanical geography, whether the plants of Europe are identical, to any extent, with those of America; and therefore all the evidence bearing on the nativity of the *Calluna* should be examined, whether in Tewksbury or elsewhere. This evidence does not seem to be very direct or conclusive. It does not certainly prove it to be an inhabitant, either in great quantity or frequency. It is mentioned in De la Pylaie's catalogue of Newfoundland plants, and also in De Candolle's Prodromus, as occurring there. Dr. Gray was told by Dr. Don, some twenty years ago, that a surveyor had brought a specimen from the interior of the island. Loudon gives it as a native of New Brunswick, on unknown authority. This is all the evidence we have to prove the *Calluna* a native of the northern regions of America.

If we find one single fossil animal in a stratum where its remains must have been deposited at its death, we may take it as a positive proof that animals of that species lived there at the geological epoch during which that stratum was deposited. But one specimen of a plant said to be gathered in a certain region does not equally prove that the plant is indigenous there; particularly when that region has been for years the dwelling-place of emigrants from the very country where that particular plant does grow luxuriantly in a wild state. At any rate, whatever may have been the origin of the few specimens of which a rather uncertain record exists, it is very certain that the *Calluna vulgaris* is, at present, no known denizen of any part of this continent. Nor can we understand why it should be destroyed, if native, by any special causes, when it thrives so well under disadvantageous circumstances at Tewksbury. If it should be found growing freely and abundantly at Newfoundland, there might be ground for thinking it indigenous, in view of the record made of it by De la Pylaie as a Newfoundland plant; yet these very regions were long ago settled by French immigrants. We imagine that the state of the country there has not changed, since his day, so much as to eradicate from existence a native shrub. Were the Heath a plant growing naturally isolated, we might more readily accord to it an occasional existence in remote localities; but this is not the case. It is gregarious in habit, robust in growth, and tenacious of life. Until it is found in such places and in such quantity as to prove undoubtedly that it is a native of North America, we must remain somewhat doubtful of the secondhand evidence now on record.

We therefore incline to the opinion that the *Calluna* is an introduced plant, at least in Tewksbury, for the reasons that it occurs in a very limited area, while every circumstance is favorable to its growth, if native, over the whole face of the northern country; because it grows luxuriantly in similar situations where it is native; because, after a known occupancy of this area for many years, it has not extended itself into surrounding places of a like character; because kindred native plants, growing in precisely the same situations, are profuse throughout the country; and because it is found near grounds used, from early times, for agricultural purposes.

Prof. W. B. Rogers read the following paper in behalf of the author:—

NOTES ON THE SURFACE GEOLOGY OF THE BASIN OF THE GREAT LAKES. BY DR. J. S. NEWBERRY.

The changes which have taken place in the physical geography of the country surrounding the great Lakes, geologically speaking, within a recent period, have been very great; how great, and dependent upon what causes, we cannot as yet definitely state, as much more study than has hitherto been given to the subject will be necessary before all its difficulties and obscurities shall be removed.

These changes to which I have referred apparently include (a) great alterations in the level of the water-surface in the lake basin, and (b) in the elevation of this portion of the continent as compared with the sea-level, with (c) corresponding alternations of temperature, all followed by their natural sequences.

The facts which lead to these conclusions are briefly as follows:—

(1) The surfaces of the rocks underlying all portions of the basin of the great lakes, except where affected by recent atmospheric action, are planed down, polished, scratched, and furrowed, precisely as those are which have been observed beneath heavy sheets and masses of moving ice.

The effect of this action is strikingly exhibited in the hard trap ledges of the shores of Lake Superior; by the *roches moutonnés* of the granitic islands in the St. Mary's River and Lake Huron; by all the hard, rocky margins of Lake Huron and Lake Michigan; by the Devonian limestones underlying the surface deposits of the peninsulas of Canada West and Michigan; by the planed and grooved surfaces of the Coniferous limestone beneath the west end of Lake Erie, and composing the group of islands off Sandusky; by nearly all the surface rocks, when hard enough to retain glacial furrows, of Ohio, Indiana, Illinois, Iowa, Wisconsin, &c.

(2) Upon these grooved and polished surfaces we find resting,—

First, *A series of blue laminated clays* in horizontal beds, containing few shells, as far as yet observed, but, in abundance, water-worn trunks of coniferous trees with leaves of fir and cedar, and cones of a pine (apparently *Abies balsamea*, *Juniperus Virginiana*, and *Pinus strobus*).

Second, *Yellow clays, sands, gravel, and boulders.* Among the latter are granite, trap, azoic slates, silurian fossiliferous limestone, masses of native copper, &c., all of northern origin, and generally traceable to points several hundred miles distant from where they are found.

(3) Millions of these granite boulders and masses of fossiliferous limestone, often many tons in weight, are now scattered over the *sur-*

face of the slopes of the highlands of Ohio; and, in some places, collections of them are seen occupying areas of several acres, and numbering many thousands, all apparently having been brought here together and from one locality.

(4) At various points are found remarkable pits, conical depressions in the superficial deposits, which have been attributed to icebergs stranding and melting, dropping their loads of gravel and stone around their resting-places.

(5) The beds of clay and other transported materials mentioned above are several hundred feet in thickness, extending from at least one hundred feet below the present water-level in the lakes to points five hundred feet or more above that level.

(6) During the "glacial period" to which I have referred, the whole country must have been relatively higher than at present, and the drainage much more free; for, during this epoch, the valleys of the streams were excavated to a far greater depth than they are at present. This is proven by the explorations which have been made in all the country bordering Lake Erie in search of rock oil. The borings made upon the Upper Ohio and its tributaries, as well as along the rivers emptying into Lake Erie, show that all these streams flow above their ancient beds, — the Mahoning and Shenango, at their junction, one hundred and fifty feet, the Cuyahoga at its mouth over one hundred feet above the bottom of their rocky troughs. The valley of the Mississippi at St. Louis and Dubuque, and the Missouri at and above Council Bluffs, exhibit precisely similar phenomena, — deep troughs excavated in the rock by the ancient representations of the present streams, subsequently submerged and filled up with drift clay, gravel, or loess; these troughs having been but partially cleared of these accumulations by the action of the rivers during what we call the present epoch.

(7) Along the margins of the great lakes are distinct lines of ancient beaches, which show that in comparatively recent times the water-level in these lakes was full one hundred feet higher than at present.

The facts enumerated above seem to justify us in the following inferences in regard to the former history of this portion of our continent. (A) At a period corresponding with, if not in time, at least in the chain of events, the glacial epoch of the Old World, *the lake region, in common with all the northern portion of the American continent, was raised several thousand feet above the level of the sea.* In this period the fiords of the Atlantic (and probably Pacific) coasts were excavated, as also the deep channels of drainage which, far above their bottoms, are traversed by the Mississippi and its branches, and indeed most of the streams of the lake country.

During this period Lake Erie did not exist as a lake, but as a valley, traversed by a river to which the Cuyahoga, Vermillion, Chagrin, &c., were tributaries. In this "glacial epoch" all the lake country was covered with ice, by which the rocky surface was planed down and furrowed, and left precisely in the condition of that beneath the modern moving glaciers in mountain valleys. Could we examine the surfaces upon which rest the enormous sheets of ice which cover so much of the extreme arctic lands, we should doubtless find them exhibiting the same appearance.

(B) *At the close of the glacial epoch all the basin of the great lakes was submerged beneath fresh water, which formed a vast inland sea.*

From the waters of this sea were precipitated the laminated clays, the oldest of our drift deposits, containing trunks and branches of coniferous trees, a few fresh-water and land shells, but no oceanic fossils. Parallel beds on the St. Lawrence, as shown by Prof. Dawson, generally contain marine remains. It would seem, then, that this was a period of general subsidence throughout the northern portion of our continent, and that the Atlantic then covered a large part of New England and Canada East.

(C) *Subsequent to the deposit of the blue clays, an immense quantity of gravel and boulders was transported from the region north of the great lakes, and scattered over a wide area south of them.*

That these materials were never carried by currents of water is certain, as their gravity, especially that of the copper, would bid defiance to the transporting power of any current which could be driven across the lake basin; indeed, that such was not the method by which they were carried is conclusively proved by the fact, that, between their places of origin and where they are now found, the blue clay beds previously deposited now lie continuous and undisturbed. By any agent, ice or water, moving over the rocky bottom of the lake basin, carrying with it gravel and boulders, these clay beds would have been entirely broken up and removed. The conclusion is, therefore, inevitable, that these immense masses of Northern drift were *floated* to their resting-places.

All the facts which have come under my observation seem to me to indicate that, during countless years and centuries, icebergs freighted with stones and gravel were floating from the northern margin of this inland sea, melting and scattering their cargoes on or near its southern shores. Subsequently, as its waters were gradually withdrawn, these transplanted materials, rolled, comminuted, and rearranged by the slowly retreating shore-waves, were left as we now find them, heaps and imperfectly stratified beds of sand and gravel.

(D) In the lake ridges (ancient beaches), which have been so fully described by Col. Whittlesey and others, we have evidence that the water of the lakes remained for considerable intervals much higher than at present. By careful study of these ridges we may hereafter be able to map the outlines of the great inland sea, of which our lakes are now the miniature representatives, and to determine by what causes, whether by local subsidence of some portion of its shores, or the cutting down of channels of drainage, this great depression of the water-level was effected.

If, with the topography of the basin of the lakes remaining precisely what it now is, the water-level were raised one hundred feet, to the ancient beach which runs through the city of Cleveland, the whole of the chain of lakes would be thrown together and form a great inland sea.

By this sea, a large portion of the State of New York would be submerged, much of Canada lying in the basin of the St. Lawrence, most of the peninsula of Canada West, the greater part of Michigan, and a wide area south and west of the lakes in the States of Ohio, Indiana, Illinois, Wisconsin, &c.

Indeed, raised to this level, the water of the lakes would submerge deeply the summit between Lake Ontario and the Mohawk, and escape at once through the Hudson to the ocean, as well as by the outlet of the St. Lawrence. At the west a similar state of things would exist: the Kankakee summit, the divide between Lake Michigan and the Mississippi, now scarcely more than twenty feet above the lake level, would be deeply buried, and the whole valley of the Mississippi flooded. We apparently have proof that the lake waters *did* once flow over this summit, as it is said that lake shells are found beneath the soil over nearly all parts of it.

While it is entirely possible that the low points in the rim of this great basin have been worn down to the present inconsiderable altitude by the action of the water flowing from it, and that the former inland sea was drained by the simple process of the wearing down of its outlets, we may well hesitate to accept such an explanation of the phenomena until conclusive evidence of its truth shall be obtained.

Geological history affords us so many examples of the instability of our *terra firma*, that we can readily imagine that local changes of level in the land have not only greatly affected the breadth of water-surface in the lake basin, but have perhaps in some instances produced what we have supposed to be proofs of great and general elevations of the water-level, which are, in fact, only indications of a local rise of the land.

Nothing short of years of patient observation and study will enable us to write anything like a complete history of the great changes which have taken place in the physical geography of the basin of the great lakes, within a comparatively recent period. Yet we may hope, and fairly expect, that by carefully tracing the lake ridges, measuring their elevation above the present water-level at various points, examining minutely the present and former outlets through which the surplus water of the lakes escapes or has escaped, that much more than we now know will be learned of this interesting subject. To stimulate inquiry in this direction, is the main purpose for which these brief notes are now written.

Mr. Scudder announced the donation of fifteen copies of the illustrated edition of Harris's "Insects injurious to Vegetation" from the State of Massachusetts. The thanks of the Society were voted for the same.

It was voted unanimously that article 3d of the constitube so altered that the last sentence shall read, "Any person who shall contribute at one time to the funds of the Society a sum not less than one hundred dollars shall be a Patron.

Messrs. A. C. Baldwin, James Freeman Allen, Jonathan Preston, William J. Preston, Lyman Nichols and Barthold Schlessinger were elected Resident Members.

March 5th.

The President in the chair.

The President read a letter from Dr. Kneeland, the Recording Secretary, stating that he had been called again to enter the medical service of the army.

Dr. J. C. White was chosen Secretary pro tempore.

Dr. White read a communication presented by Dr. Kneeland "On some Anatomical, Physiological and Zoölogical Points suggested by J. Emerson Tennant's Natural History of Ceylon."

The Corresponding Secretary presented by title a paper containing "Observations on the summit structure of Pentremites, the structure and arrangement of certain parts of Crinoids, and descriptions of new species from the carboniferous rocks at Burlington, Iowa, by Charles A. White." Referred to the Publishing Committee.

Dr. C. T. Jackson remarked upon the recent discovery of gold in Nova Scotia, and the general lithological characters of that Province. The metal is found in slate rocks and the quartz veins connected with them. The locality of its occurrence was not visited in his survey.

Mr. Marcou stated that the gold of the Atlantic coast was of another formation from that of California. The slate of Nova Scotia was metamorphic Taconic rock. There had been found in North Carolina beds of red sandstone containing gold washed into it during its formation, showing its existence previous to the formation of the latter. In California the quartz gold-bearing veins seldom occur in the slate itself. We appear to have in America gold of two different periods. In Australia the gold is entirely of the drift period, while that of the Atlantic coast is of anterior date.

Mr. Gaffield exhibited a peculiar form of crystallization occurring in a pot of window glass resembling a Nasturtium seed. It was probably silicate of lime.

March 19th.

Dr. A. A. Gould in the chair.

Prof. Henry J. Clark presented the following communication: —

LUCERNARIA THE CŒNOTYPE OF ACALEPHÆ. BY PROF. HENRY JAMES CLARK, OF HARVARD UNIVERSITY, CAMBRIDGE.

The present communication is a mere sketch of a most thorough and exhausting anatomy of Lucernaria, which I have illustrated by numerous plates, and which I propose to publish in an extended memoir, in connection with some considerations upon the general morphology and systematic relations of Acalephæ. I have been engaged during the whole of the past year upon the organical and histological anatomy of this animal, in order to determine what are its relations to Radiata in general, and to Acalephæ in particular. I have had abundant materials for study, inasmuch as this species of Lucernaria is a very common inhabitant of our shores, wherever the eel-grass, Zostera marina, grows. Almost invariably Lucernaria is to be found upon the Zostera, and very rarely upon any other plant.

It may be obtained from the last of August, when it is most frequently met with in a young state, until the last of June, at which time the young ones of the autumn season have developed to full-grown animals. In an adult state it measures nearly an inch across the disc, exclusive of the tentacles, and about the same in height. It varies in color from green, which is the most common tint, to deep olive; from light yellow to reddish brown, or from light violet to the deepest purple. In form it is octagonal, and most frequently it so comports itself that the four sides opposite the bifarious genitalia are shorter than those alternating with them, but frequently the same individual reverses the order of things, and the latter become either as short, or even shorter, than the first. From this we infer that the specific differences, based upon the approximation of the bunches of tentacles, two and two, are entirely erroneous. As these animals are very sensitive and irritable, they contract upon the least disturbance; and, as the muscular system is most highly developed in the region which lies about the four partitions of the disc, it is most natural that when the creature contracts it should draw the two halves of the genitalia and the bunches of tentacles together more closely here than at the alternate quarters; hence arises the frequently-observed quadrate outline of the disc. Again, in regard to another feature oftentimes employed to discriminate between different species or even groups, I would say that the absence of auricles does not indicate a specific difference from those individuals possessing them, but rather an accidental atrophy of these organs; and that this fact is to be classed in the same category as the occasional development of one of the tentacles into a semiauricular body. I have always noticed that individuals in such a condition have an unnatural appearance; that they are not so lively as the others, and appear to be diseased. I believe this species to be identical with the *L. auricula* of the English coast. The most characteristic figure that I know of, although unsatisfactory, is in Gosse's little book, "*The Aquarium.*"

In order to contrast the structure of Lucernaria with that of the Steganopthalmatan Medusæ, and, moreover, in order that I may not complicate matters, I will compare it, organ for organ and part for part, with one of our most common medusæ, *Aurelia flavidula*, Agassiz. The aboral side, which corresponds to the so-called dorsal region of other Acalephæ, projects at the apex into a moderately long columnar body, usually called the peduncle of Lucernaria. With the exception of the four equidistant channels and the four muscular cords which alternate with them, the peduncle is a solid gelatiniform mass, covered by the outer wall. This gelatiniform substance also constitutes the bulk of the disc, filling the entire space between the outer wall and the inner or lining wall of the digestive cavity, and is directly continuous with that in the peduncle. In Aurelia, Cyanea, and other Acalephs, this substance appears like an amorphous gelatiniform or semicartilaginous mass, with a few irregular cells scattered here and there; but in Lucernaria it has a highly organic structure. Extremely elongate, columnar, cell-like bodies extend in close proximity from the outer to the inner wall, so that, in a section of the thickness of the disc, it appears to be transversely striated. In the peduncle, as a transverse section reveals, these columnar cells are arranged about the axis in peculiar, regular groups; some columns pass from one channel to the next on either side; some diagonally across the axis from one channel to an opposite one, and others extend obliquely from the channel to the muscular cords which alternate with them. This arrangement reminds one of the methodical disposition of the great cells in the body of Pleurobrachia, as I have described them in Prof. Agassiz's third volume of his "Contributions to the Natural History of the United States." In the oral or lower side of the disc of Aurelia the gelatiniform substance has the same structure as in the aboral side, whilst in Lucernaria, although it has all the regularity in the disposition of its components that obtains in the aboral side, yet it possesses a totally different nature, as I will describe hereafter in connection with the muscular system.

From the middle of the base of each of the four flat sides of the quadrate proboscis a light streak, which has the deceptive appearance of a radiating canal, passes in a direct line nearly to the border of the disc; this is the line along which the oral and aboral floors of the disc unite, and form a solid partition, by which the digestive cavity is divided into four broad chambers, which communicate with one another at the inner or proximal ends, about the base of the proboscis, and also at the outer or distal ends through the narrow passage between the terminus of the partition and the edge of the disc. In the peduncle there are four equi-distant broad tubes, which merge into one cavity at its base, and correspond in position to the four chambers of the digestive cavity. The grouped tentacles which occupy the eight corners of the disc are hollow, as, likewise, are the auricles, and communicate openly and directly with the digestive cavity. This is all that constitutes the chymiferous circulatory system of Lucernaria. In Aurelia we have radiating canals at the points corresponding to the partitions of Lucernaria, as well as in the intermediate sections.

In Aurelia, the genitalia are four single circular organs, one of each being placed opposite the flat side of the proboscis; whereas in Lucernaria each genital is a double organ, the halves of which have a peculiar shape, and are situated respectively one on each side of the partition, and extend along the inner face of the oral floor of the disc from the base of the proboscis to the extreme limits of the corners of the disc, where they almost touch the bases of the tentacles. Across the proximal end of each partition, triple or quadruple rows of slender digitiform bodies extend each way for a considerable distance along the border of each half of a genital, thus forming the common appendages of the two, and clearly indicating their *unity*. Each half has a peculiar form, which may be represented by an inequilateral triangle whose longest side extends nearly in a straight line from the inner end of the partition to the tentacles, and the two other sides, slightly curving outwardly and meeting at a very broad angle, form the rest of the outline. In the adult, the longest side of the triangle is to its height as two to one. This feature, alone, has a degree of speciality which raises these organs in rank above all others of their kind among Acalephæ; but when we examine their components, we find an unlooked-for structure, hitherto unknown among Acalephæ. What appear, to the naked eye, to be eggs of enormous size, are really little pouches, which contain either numerous eggs or matrices of spermatic particles, according as the individual is male or female. Each pouch, or *genital saccule*, as it may be called, projects freely into the digestive cavity, and is attached by a very short and rather narrow neck to the inner wall of the oral floor of the disc. This constitutes another step in the specialization of these organs, but does not complete the process. At the base of each genital saccule, and on that side which faces toward the proboscis, there is a small aperture, which leads to the interior, where there is a considerable cavity. This cavity is formed by the lateral inversion of the single wall of the saccule upon itself, and the constriction of the wall about the entrance to the chamber. The eggs or spermatic material are enclosed in saccular folds of the wall of this chamber, and into which they fall when mature, and pass thence outwardly through the lateral outlet at the base of the saccule. One may see at a glance that this is a type of the reproductive organs not to be found among the other Acalephæ.

In Aurelia, the generative products, whether eggs or spermatozoa, lie immediately beneath the *outer wall*, and imbedded in the muscular layer which extends throughout the length and breadth of the oral face of the disc, as I have described it in the fourth volume of Professor Agassiz's "Contributions." Between the muscular layer and the inner wall, which forms the immediate parietes of the digestive cavity, a thick layer of gelatiniform substance intervenes, and its presence naturally suggests the inquiry, how are the eggs or sperm to escape into the digestive cavity, as they are known to do? The spermatic particles I have observed frequently escaping directly through the outer wall into the ocean, and I have seen them, with the broadest end out, projecting like bundles of hairs from the cavity of the matrix through the apertures in the outer wall. When the reproductive material is fully ripe, the inner wall, with the gelatiniform layer, and the muscular layer as far as it includes the material in question, splits off from the outer wall along two lines corresponding to the two borders of the generative organ, and hangs loosely, in ribbons, in the digestive cavity. From the newly-formed raw face of these ribbons the eggs or spermatic particles escape into the main chamber of the disc. This I take to be the universal rule, and such the type of genitalia among all Steganophthalmata; a structure totally unlike that of Lucernaria, in which the *inner wall* alone is concerned in the highly complicated reproductive organs.

Passing now to the consideration of the *muscular system*, I will call your attention to the four white, slender columns which alternate with the four dark tubes which are imbedded in the gelatiniform substance of the peduncle. Sars was the first to indicate the true nature of these columns, and he rightly called them muscular cords They extend from the base of the peduncle to the base of the proboscis, coursing along just beneath the outer wall, but still within the gelatiniform substance, until they reach the upper third of the peduncle, and then gradually approximating the axial line, they meet the inner wall of the disc just below the base of the proboscis, and thence they pass along still beneath this wall, for a short distance, and, finally *each one enters the oral side of the disc* at the inner or axial end of the partition. At this point, each muscular column expands and forms a fan-shaped layer just beneath the outer wall, and extends laterally so as to occupy the whole space between the two halves of a genital. At the distal end, this layer diverges right and left of the partition into a broad muscular band which borders the disc, and, eventually, is distributed in ridges or cords beneath the outer wall of the tentacles and the auricles. At the inner end of the partition, the muscular layer also passes into the base of the proboscis, and forms a stratum immediately beneath the outer wall. At four equidistant points, alternating with the partitions and genitals, and opposite the four corners of the proboscis, there is a weaker muscular layer, which occupies the same relative position in regard to the outer wall as does the stronger system of muscles first mentioned. On the one hand, it passes into the marginal muscular band, and on the other it enters the corners of the proboscis, and forms a layer in common with the one extending from the partitions. By these alternating stronger and weaker divisions of the muscular layer, the disc is relieved of the sameness which prevails in the muscular system of the Steganophthalmata, and we have indubitable proofs of a higher degree of speciallization than in the latter order, where the unvarying repetition of similar divisions all around the disc unmistakably indicates inferiority. Moreover, in addition to this, we have a peculiar specialization of the gelatiniform layer, which is embraced by the outer and inner walls of this floor, or rather between the muscular layer and the inner wall; instead of repeating the peculiarities of the gelatiniform layer of the aboral floor, as occurs in Aurelia, it has a totally different appearance and consistency, and an almost unlimited degree of expansion and contraction. In the tentacles it occupies a very deep space between the outer wall, or rather the muscular layer, and the inner wall. In this latter respect, Lucernaria is again peculiar, since in addition to the muscular layer, which alone is present in the young, it develops this gelatiniform layer, — the *musculo-gelatiniform layer*, as I propose to call it,— the like of which does not exist in the tentacles either of Steganophthalmata or Gymnophthalmata. In the auricles, we have also a specialization peculiar to Lucernaria; for in addition to the pigment eye-spot which is imbedded in the base of the oral face of these bodies, the auricles, which in the young cannot be distinguished from the tentacles, gradually thicken the outer wall as age advances, and peculiar, granuliferous, adhesive vesicles are developed between the cells. In the adult, their tentacular nature is almost, or altogether, obliterated, and the swollen outer wall, together with the enormous thickness of the musculo-gelatiniform layer, form an oval mass, thickly studded with adhesive organs, by which they cling, in a most tenacious manner, to any body which they may touch. These organs, and the base of the peduncle, are the only means of adherence which Lucernaria possesses; although it is true that the tentacles are used, as in Aurelia, for prehension, they are, comparatively, very weak, and can only serve to retain the prey, and never effect the purpose for which the auricles are constructed. In consideration of the very obvious office of an auricle, I would propose the name *anchor* for it.

Were the above-mentioned features in the organism of Lucernaria alone to be taken into account, there could be no hesitation in saying that this genus should be considered as the highest of the class of Acalephæ; because of its highly complicated and specialized gelatiniform mass; the high grade, and the peculiar and distinctive grouping of its muscular system; the definite and bilateral form of the genital organs, as well as their saccular subdivision; the two-fold nature and disposition of the prehensile organs, the tentacles and anchors; and, moreover, that it belongs to an order separate from either orders of Acalephæ, because of the typical elements of its genital saccules, which are altogether different from either the Steganophthalmic or Gymnophthalmic type of genitals; and also on account of the anchors, which have no parallel in all the class of Acalephæ. But there are parts of the Lucernarian organism which are of a lower grade than those of similar nature among the other Acalephæ. I refer, in the first place, to the hydra-like form of Lucernaria, and its comparatively stiff and hydroidal tentacles, evidently indicating a typical affinity to the fixed hydroid generation of the Sarsiæ, Bougainvilliæ, Steenstrupiæ, etc. The simple, almost unilocular chymiferous system is hardly less medusoidal, as regards the multiplicity of its subdivisions, than in some of the Tubularians, such as Tubularia and Corymorpha, which are described in Professor Agassiz's fourth volume of his "Contributions." In connection with the hydroid form of Lucernaria, I would also mention the total absence of a veil. This might, at first thought, appear to furnish an argument in favor of the high relations of this genus; but I think it is to be deemed as one of the signs of its inferior connections. However, let us look at the progress of velar development. In the *ephyra* state of all Steganophthalmata, the veil is at one time greatly in the preponderance, when compared with the size of the whole individual; but with growth it gradually becomes less conspicuous, and, finally, in some adult genera of this order, it remains as a mere trace of a veil, or, as in Cyanea and some Rhizostomidæ, it is altogether obscured. Now, it is noteworthy that among the lowest of this order, such as Pelagia, we have a strong resemblance to the ephyra state, and the ephyroid, tongue-like veil is quite prominent; and in Chrysaora it is hardly less so; ascending the scale, we find it yet more inconspicuous in Aurelia, and still more so in Cassiopeæ; and, finally, altogether absent in Cyanea, the highest, in my opinion, of all the Steganophthalmata. Now, one might suppose Lucernaria, in respect to the veil, to be in the same category with Cyanea, which has resorbed its veil; this, however, is not the case, for, as I know, from the study of the younger stages of Lucernaria, that it never passes through the veiled phase, it falls short in its development as regards this particular feature of Acalephan morphology. We must take into consideration, also, the eyes, which are found to be as low in point of structure as the merest pigment eye-spot of the Gymnophthalmata.

Thus, in balancing the value of the organisms of this animal, we are inevitably led to the conclusion, on the one hand, that Lucernaria does not stand *as a totality* above all other Acalephæ, nor, on the other hand, does it, by any means, belong below them; and that much less does it affiliate exclusively with the Gymnophthalmata. The only relation that it possibly can be considered under is that of *a correlation to both types of Acalephæ*,—viz., to the Gymnophthalmata, including the Siphonophoræ, and to the Steganophthalmata; but yet not as a graduated connecting link, which would seem to show that the two orders pass the one into the other, but as an *ordinal type*, equivalent in value to either of the others, by reason of the peculiar and distinctive morphology of certain of its organs. On this account, Lucernaria is to be considered, and may be designated, as the *cœno-type* (κοινὸς, common) of the Acalephæ. In this respect, it holds such relations to the other two orders of Acalephæ as do the Crinoids to the other orders of Echinodermata: or the Annelidæ to the rest of the Articulata: or the Selachians to the true fishes and the reptiles; but, at the same time, containing organic features which separate each of them as a type from the others.

In order that no confusion may arise here, I would state most explicitly that I do not consider the Ctenophoræ as one of the orders of Acalephæ, but deem them to be a class by themselves, equal in value to either of the classes of Radiata, whether Polypi, Acalephæ, or Echinodermata, and standing next in rank to the Echinodermata. The division of the alimentary system of Ctenophoræ into two portions, as among Polypi, is sufficient to separate them from the Acalephæ, since the typical form of the corresponding system in the latter is a unity: moreover, the position and peculiar relations of the tentacles of Ctenophoræ are hardly of less importance, in these considerations, as distinctive characters. I cannot conceive that the Ctenophoræ may be included in the same classific type with the Acalephæ without doing violence to correlative ideas such as are expressed in the organism of the former; and much less can I admit that they have the most distant relation to the Polypi, excepting that, like the latter, they are Radiates. The same kind of arguments that have been used to show that Ctenophoræ and Polypi belong to one class might, with equal justice, be advanced to prove that the Acalephæ are Polypi. We must not mistake a similarity for an identity, any more than that the cry of a child would identify it with a cat, because their voices sound alike, and cannot always be distinguished the one from the other by any single faculty of our senses.

The following tabular view presents at a glance the relations of the Lucernaridæ to the other orders of Acalephæ, and at the same time indicates the position of the Ctenophoræ among the other classes of Radiata.

POLYPI.	ACALEPHÆ.		CTENOPHORÆ.	ECHINODERMATA.
		Steganophthalmidæ.		
	Lucernaridæ			
		Gymnophthalmidæ.		

April 2, 1862.

The President in the chair.

Dr. C. T. Jackson made some remarks upon the manufacture of writing inks. He thought they could be made much better, if not more cheaply, directly from the chemical principles themselves than from the crude substances now employed, which contain uncertain and variable proportions of the requisite materials. He described at some length the composition and merits of the various inks manufactured here and in other countries.

Mr. C. K. Dillaway read the following letter from Mr. I. A. Lapham, of Milwaukee, Wisconsin, on the habits of *Sphyrapicus varius*, Baird: —

Your Mr. E. A. Samuels, in the Wisconsin Farmer, — probably misled by some blundering newspaper report of the remarks (not lecture) of Dr. P. R. Hoy, of Racine, Wisconsin, on the habits, &c., of the *Sapsucker*, made before the Illinois Horticultural Society, — has done that careful, accurate, and scientific naturalist much injustice, accusing him of things of which he is not guilty. Dr. J. P. Kirtland, of Ohio, was the first naturalist who expressed his belief in the "popular opinion" on this subject, but unfortunately he did not investigate the matter. Dr. Hoy has recently ascertained that the food of the Sapsucker is the juice and inner bark of trees, and has presented the facts verbally, as indicated above. This little bird differs so much from the true woodpeckers, that Professor S. F. Baird * very properly made it the type of a new genus, — it is now known as *Sphyrapicus varius*, Baird, — and is the only bird properly entitled to the name of *Sapsucker*. The tongue cannot be protruded much beyond the extremity of the bill; at the tip or horny portion, it is broad, flat, and rounded, especially adapted to the work of scooping out the tender inner bark of trees. It differs in these particulars from the tongue of the woodpeckers proper, which may be extended two or two and a half inches beyond the beak; the tip is narrow, sharp, and beset with strong barbs, especially adapted to the work of extracting grubs and insects. The contents of the stomach, examined in numerous cases, at different seasons of the year, indicated only vegetable substances. Fresh specimens were sent to Dr. Joseph Leidy, of Philadelphia, whose dissections fully confirmed the observa-

* Pacific R. R. Report, Vol. IX., p. 101 (1858.)

tions and deductions of Dr. Hoy. The punctures made by the *Sphyrapicus* are usually arranged in several rows around the tree, and are so numerous as often to *girdle* the tree, and, especially in tender kinds, destroy its vitality. The damage done to young trees in and about Milwaukie and Racine is very considerable. The trees punctured are the maple, mountain ash, pine, spruce, pear, apple, cherry, ironwood, basswood, silver poplar, and perhaps others. While Dr. Hoy advises the destruction of this bird, he pleads as earnestly as Mr. Samuels can for the protection of the *Picus villosus*, and all other harmless creatures.

The President gave an account of the dissection of a Hottentot, who recently committed suicide in this city.

The subject was a young and healthy adult, who came to his death by suicide. The chest was well formed and prominent, the shoulders were well made but not broad, the loins very hollow, the hips narrow, the thighs full and feminine, and the calves slender. There was no beard, no hair in the axillæ or on the pubes. The ears were well formed, but the lobule was quite small. The web between the fingers was more extensive than usual, and gradually increased in breadth from the index to the little finger, where it reached as far as the joint between the first and second phalanx.

Height of the body - - - - - -	$65\frac{1}{2}$	inches.
Spread of arms from tip to tip of middle finger	66	"
From top of head to top of trochanter - -	$29\frac{1}{2}$	"
From top of trochanter to sole of foot - -	36	"
Breadth of shoulders - - - - -	13	"
Breadth of waist - - - - - -	$9\frac{1}{2}$	"
Breadth of hips through trochanters - -	$11\frac{1}{4}$	"
Length of arm from acromion - - -	$30\frac{1}{2}$	"
Length of thigh from trochanter - -	18	"
Length of leg from top of tibia to sole - -	18	"
Length of hand - - - - - -	$7\frac{1}{4}$	"
Length of foot - - - - - -	9	"

From a comparison of the above measurements it will be seen, that while the height of the body and the spread of the arms are almost exactly equal, and thus conform to the standard of a well-proportioned man, the legs are disproportionately long. The tops of the trochanters, instead of being in the middle of the whole height, are five and a half inches above it.

The brain weighed 3 lbs. 2 oz. av., which is about the average weight of a European brain. There are no weights of the brains of Hottentots given in the tables of the comparative weight of the human brain. Dr. Morton gives the measurements of the three Hottentot crania, the average capacity of which is 75 cubic inches. A cubic inch of brain is estimated to weigh 259.57 grains, and this multiplied by 75 would give, as the whole weight, about 2 lbs. 12 oz. av.

Mr. Bouvé asked Dr. Jackson if he had observed any evidence of metamorphic action in the conglomerate rocks of our coast. He had noticed, by the wayside near Hingham, a blood-red rock, resembling Saugus jasper, which he had suspected to be an altered conglomerate, and yet he had never discovered anything of a slaty or pebbly character about it. A short time since, he had found the locality from which these specimens had been taken, near the Ocean House, and had traced it running into true conglomerate.

Dr. Jackson said that he had often seen this red rock, and had frequently traced it into the slate. In Roxbury, rock pebbles of quartz and granite were to be found adhering closely together without any sign of cement. Chemistry reveals the fact that the surfaces are composed of silicate of lime formed by the action of heat. In the vicinity of certain trap-dykes in Rhode Island, the pebbles are often covered with crystals of specular and magnetic iron, produced by the decomposition of the sesquichloride under the influence of water and heat. Argillaceous minerals, also, in conglomerate are often charged with peroxide of iron. He thought this could not be explained by the simple conduction of heat from trap-dykes, but that, in accordance with D'Aubrèe's theory, superheated water must have been the active agent in the changes alluded to.

Messrs. Francis G. Sanborn and J. T. Rothrock were elected Resident Members.

April 16, 1862.

The President in the chair.

Mr. Scudder read the following communication from Mr. E. S. Morse, of Portland, Maine: —

THE HÆMAL AND NEURAL REGIONS OF BRACHIOPODA. BY EDWARD S. MORSE.

In a paper read before the Boston Society of Natural History, by N. S. Shaler, entitled, "Lateral Symmetry in Brachiopoda," it is assumed that the valves of Brachiopoda occupy an anterior and posterior position in their relations to the animal. Statements are also made to the effect that "Naturalists have very generally failed to find any evidence of bilaterality in their organization." and also that a "fruitful source of trouble has been that Malacologists are acquainted with the arrangement of the valves in Lamellibranchiata before they examine the Brachiopoda, so that they come to consider the latter order with a vague impression that all bivalves must have the shells in a similar relation to the animal."

Such remarks unfortunately do injustice to the labors of our Malacologists, and should be corrected: for, since the researches of Cuvier, and still later Owen and Hancock, naturalists have never doubted the relative position of the two valves of Brachiopoda, which have been considered to bear a dorsal and ventral position to the animal; and it will be evident to all that in viewing their relations thus, the lateral symmetry is apparent and plain, though the assertion is made that the feature of bilaterality seems to be altogether wanting when the valves are thus considered. It seems strange that Mr. Shaler should have overlooked the fact that whether we consider the valves dorsal and ventral, or anterior and posterior, precisely the same imaginary line is drawn, and the same identical valves are made. The statement that the valves are before and behind, I believe to be an incorrect interpretation of the true homological relation which the test bears to the animal: and, furthermore, the manner in which he determines the longitudinal diameter, by passing a plane through the two extremities of the alimentary canal, is, I believe, a misconstruction of these relations.

For the reasons that the terms dorsal and ventral are indiscriminately used in various departments in the animal kingdom, and quite improperly express the regions in mollusca, to which they are generally applied, the dorsal region, which contains the heart, has been designated the Hæmal Region, and the ventral region, which embraces the great nerve-centres, has been called the Neural Region. I shall therefore adopt the terms hæmal and neural, as they more properly express an idea of the parts intended.

In order to appreciate clearly the true longitudinal diameter of the Brachiopoda, we must consider the various members belonging to the order of Polyzoa, to which, without doubt, they are intimately connected; and if we would find the longitudinal diameter of Polyzoa, we have only to compare them with the Ascidian Tunicata. G. J. Allman, in his Monograph of the Fresh-Water Polyzoa, published by the Ray Society, has so clearly pointed out the close homologies existing between the Polyzoa and Tunicata, and illustrated them by excellent diagrams, that it would be doing injustice to him were I to attempt a résumé in the limited space of this paper. Suffice it to say, he shows clearly the homological relations between the two orders in the structural affinities between the branchial sac of the Tunicata and the palpi of the Polyzoa, in the relative position of the organs of nutrition, the opening and termination of the intestinal tube, and in the relative position of the nervous ganglion, and finally the corresponding structure of their outer envelopes. He figures a Clavalina-like Tunicate, and a Plumatella-like Polyzoon: in his relative comparisons he has placed figures of the two side by side in the natural position in which they are found. The longitudinal diameter in both is a line drawn from the base of attachment through the body and parallel with the sides of the animal. To homologize the Lamellibranchiates with the Tunicates, we have only to compare the common Mya with an Ascidian, and the relation between the syphonal tube of the one with the incurrent and excurrent orifices of the other will be obvious at once; and an anatomical investigation of the two animals will render these relations still more apparent. Now, in order to obtain the longitudinal diameter in the Brachiopoda, we must follow the connection between typical forms of this order with members of the order of Polyzoa; look at the simplest Polyzoon where the investing sac is a mere tube: we have no appendage to the cell-wall developed, though its bilaterality is plainly expressed in the horse-shoe shaped lophophore: but, as we advance, we find, on the hæmal side or region of the animal, as in Loricula and Eucratea, a lid developed, called the operculum, which is strictly homologous with the hæmal valve of the Brachiopoda. In the Lepralia and Flustra-like forms, this lid assumes more importance, and the homologies of the retractor muscles of this lid with corresponding muscles in Terebratula have been clearly pointed out by Huxley. If we lay one of these Loricula-like forms in a normal position, do we not find that the mouth, with the palpi, is at the free end of the body, as in Terebratula, while the other end, that is, the neural portion of the cell, is attached precisely as we find in Terebratula?

To make the case still more intelligible, let us compare the articulation of the cell and operculum of a Cheilostomatous Polyzoon or the two valves of an Avicularia with the two valves of the typical Brachiopoda. The two valves in the latter case are articulated in the same manner as obtains in the valves of a Polyzoon or in the valves of an Avicularia. The shell of Brachiopoda consists of two valves, — one large, through which the peduncle passes for attachment, the other small, — which homologize with the larger and lesser valves of Polyzoa. So, also, does the termination of the intestine turn from the smaller valve in Terebratula as in the Polyzoon cited above. Thus the brachial arms of the one are in strict homological relation with the lophophore of a Hippocrepian Polyzoon. As we ascend to the Brachiopoda, we behold with interest the increasing prominence and enlargement of the hæmal valve, and at the same time a more limited movement of the palpi, which, in the lower forms, can be extended free of the cell; but as we approach Terebratula through Lingula, we observe less mobility of the hæmal valve, and a restricted movement of the brachial arms. Let us examine Lingula, which is quite long, flat, and broad, and we find the mouth pointing toward the open part of the valves, as in the Polyzoa, on each side of which is coiled a brachial arm identical with the lophophore of Polyzoa in junction and position. We find the intestine also running parallel with the sides of the body, at its posterior portion becoming convoluted and terminating on the right side, the straight part producing a curve arching toward the hæmal valve and surmounted by a heart as we witness in most Lamellibranchiata; showing clearly in this view alone its homological identity with the Lamellibranchiata. In Terebratula the curvature of the intestine is still greater, as the shell is made shorter and more inflated, and consequently the mouth is forced back to admit room for the coiled brachial arms, and the intestine is seen abruptly bent in an almost vertical plane, arching toward the hæmal valve, and apparently trending across the body from one valve to another.

The limits of this paper will not allow us to carry homologies from this point to the other two classes of mollusca, and in fact it would be hardly necessary to do so, as the path is rendered apparent and plain through the medium of Lamellibranchiates.

Mr. T. T. Bouvé exhibited a poisonous snake, which had been taken alive from a pile of wood brought from the west coast of Africa more than a year ago.

Mr. F. W. Putnam stated that it was a poisonous snake belonging to the genus ELAPS. It was a representative of a species that he had never seen before. It differed from the *Elaps fulvius* of the Southern States by the greater number and smaller size of the black rings on the body. There have been several species of the genus described from South America.

Mr. Putnam made a few remarks upon snakes in general, saying that he had of late been engaged in cataloguing the Reptiles in the Museum of Comparative Zoölogy; and that in the course of this work he had found it necessary to make several changes in the classification of North American snakes, as given by Messrs. Baird and Girard in their catalogue, and could not, from his observation, sanction the large number of species mentioned in that work. He gave for an example the genus *Eutænia*, B. and G., to which our striped snake belongs; of this genus he had examined many hundred specimens, and had found several of the so-called species running into each other to such an extent, that it was impossible, upon any natural grounds, to consider them as distinct species. He was, therefore, inclined to the opinion that not more than one-third to one-half of the so-called species of *Eutænia* could be retained. Of the two oldest forms, *Coluber ordinatus* Linn. and *C. sirtalis* Linn., he had examined a very large number of specimens from all parts of our country comprised in the Atlantic slope, and he had found every stage of color and markings, from the greenish, checkered specimens of the South, through the dark, yellow-striped ones of the Middle States, to the red-checked ones of the North; and he considered them all as belonging to one species, for which the specific name of *ordinatus* should be retained; and if it should prove that EUTÆNIA is a synonym of TROPIDONOTUS, the species would stand thus: —

TROPIDONOTUS ORDINATUS, Holbr.

SYNONYMS. — Vipera gracilis maculatus, *Catesb.*
Vipera viridis maculatus, *Catesb.*
Coluber ordinatus, *Linn.*
Coluber sirtalis, *Linn.*
Tropidonotus bipunctatus, *Schl.*
Tropidonotus tenia, *Dekay.*
Tropidonotus ordinatus, *Holbr.*
Tropidonotus sirtalis, *Holbr.*
Eutænia ordinata, *B. & G.*
Eutænia sirtalis, *B. & G.*
? Coluber parietalis, *Say.*
? Eutænia parietalis, *B. & G.*
? Eutænia radix, *B. & G.*
? Eutænia dorsalis, *B. & G.*
? Eutænia Haydenii, *Kenn.*

We have in New England another well-marked species of striped snake belonging to this genus, the COLUBER SAURITA Linn., to which I should refer as synonyms the *Eutænia*

Faireyi, B. and G., and ? *E. proxima*, B. and G. This species is at once recognized by its more slender body and long tail, and by a white spot in front of the eye.

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

From the Kaiserliche Akademie der Wissenschaften, Wien, October 4, 1861 ; the Dublin University Zoölogical and Botanical Association, November, 1861; the Portland Society of Natural History, February 12, 1862, acknowledging the receipt of the Society's publications; the Königliche Bayerische Akademie der Wissenschaften, December 2, 1861, acknowledging the same, and presenting various publications; Verein für Naturkunde im Herzogthum Nassau, August 1, 1861; Königliche Preussische Akademie der Wissenschaften, August 31, 1861; Royal University of Norway, October 26, 1861, presenting various publications; Pollichia zu Durckheim, May 22, 1860, and Offenbacher Verein für Naturkunde, July 1861, presenting their publications and desiring an exchange.

Milton Andros, Esq., of Boston, and Dr. H. J. Cate, of Framingham, were elected Resident Members.

DONATIONS TO THE MUSEUM.

January 1. Insects, crustaceans, fish, a snake, and a specimen of the wild potato from the island of St. Lorenzo, opposite Callao, Peru, by Dr. C. F. Winslow. Hair-ball from the stomach of a steer, by Mr. B. F. Penniman. Skin of a monkey from Africa, by Mr. Kilby Page.

January 15. A valuable collection of objects of Natural History, and specimens of the manufactures of the East Indian and Pacific people, by the Boston Marine Society; a large number of foreign mollusca, two echini, and tooth of a sperm whale, by Mrs. Charles Torrey; a skate, and strip of manati hide from the south side of Cuba, by Mr. S. E. Guild; specimens of *Heliastræa* from Silver Cay, off Turks Island, attached to articles from the wreck of a vessel supposed to be the British frigate Severn (lost here in 1793), together with the log-book of the vessel which obtained them, by Messrs. Sampson & Tappan.

February 19. Specimens of wild rice (*Zizania aquatica*) from Lake Superior, by Dr. C. T. Jackson; copper from Lake Superior, by Horatio Bigelow, Esq.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1862.

Memoires pour servir à l'Histoire Naturelle des Petrifications. 4to. La Haye, 1742. *From Dr. Geo. Russell.*

Agriculture of Massachusetts. By C. L. Flint. Boston. 8vo. 3 vols. 1858–60. *From C. L. Flint, Secretary of the State Board of Agriculture.*

Treatise on some of the Insects Injurious to Vegetation. By T. W. Harris. 8vo. Boston, 1862. (15 copies.) *From the Legislature of Massachusetts.*

Catalogue of the Trowbridge Collection of Natural History in the University of Michigan. 8vo. Pamph.

New Species of Lower Silurian Fossils. By E. Billings, F. G. S. 8vo. Pamph. Montreal, 1862. *From the Author.*

Report on the Geology of Vermont. 2 vols. 4to. Claremont, N. H., 1861. *From C. H. Hitchcock.*

Report on the Colorado River of the West. 4to. Washington, 1861. *From Dr. J. S. Newberry.*

The Heather (Calluna vulgaris) a Native of the United States. By Edward S. Rand, Jr. 8vo. Pamph. 1862. *From the Author.*

Fourth Report of the Geological Survey of Kentucky in 1858–59. By David Dale Owen. 8vo. Frankfort, Ky. *From L. Lesquereux.*

A Revision of the Species of Baculites described by Dr. Morton. By W. M. Gabb. 8vo. Pamph. *From the Author.*

Reports of Explorations, etc., for a Rail-Road from the Mississippi River to the Pacific Ocean, 1853–56. Vol. XI. 4to. Washington.

Report of the Commissioner of Patents for 1860. Agriculture. 8vo. Washington. *From Hon. C. Sumner.*

On the Mollusca of Harper's Ferry, Va. 8vo. Pamph. Synopsis of Recent Species of Gastrochænidæ. By Geo. W. Tryon, Jr. 8vo. Pam. *From the Author.*

Würtembergische Naturwissenschaftliche Jahreshefte. Nos. 1, 2, 3. 1861. 8vo.

Journal of the Proceedings of the Linnean Society. Botany, Nos. 16–20; Supplement to Vol. IV., and two Supplements to Vol. V.; Zoölogy, 18–20. 8vo. London, 1860–61.

Transactions of the Linnean Society. Vol. XXIII., Part 1. 4to. London, 1860.

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Annals and Magazine of Natural History. Dec., 1861, and Jan. and Feb., 1862. 8vo. London. *From the Courtis Fund.*

New England Genealogical Register. No. 1, Vol. XVI. Jan., 1862. 8vo. Boston.

Last Political Writings of Gen. Nathaniel Lyon, with a sketch of his Life. 12mo. New York, 1861.

Lives of Donne, Walton, Hooker, Herbert, and Sanderson. By Izaak Walton. 8vo. Boston, 1860.

Sketches of the Natural History of Ceylon. By Sir J. Emerson Tennent, LL. D. 8vo. London, 1861.

Memorials of the Dead in Boston; containing exact Transcripts of Inscriptions on the Sepulchral Monuments in the King's Chapel Burial Ground, in the City of Boston. 12mo. Boston, 1853.

Memoir, Letters, and Remains of Alexis de Tocqueville. 2 vols. 12mo. Boston, 1862.

Twenty Years around the World. By John Guy Vassar. 8vo. New York, 1861.

The Constitutional History of England. 1760 to 1860. By Thomas Erskine May, C. B. Vol. I. 8vo. Boston, 1862. *Deposited by the Republican Institution.*

May 7, 1862.

ANNUAL MEETING.

The President in the chair.

The Treasurer presented a Report, in full, of the financial condition of the Society; also, the Annual Report of the Trustees of the Courtis Fund.

The Auditing Committee stated that they had examined the accounts, and had found them correctly cast and properly vouched.

The Librarian reported that three hundred and thirteen volumes and parts of volumes, and one hundred and twenty pamphlets, had been received during the past year, mainly through exchange with foreign societies. He suggested the expediency of re-printing missing signatures of the Proceedings, in order that our exchanges might be extended.

The Curator of Geology and Palæontology stated that the most valuable additions to his department consisted of specimens of tracks of animals upon the Connecticut River sandstone, purchased from Mr. Field, of Greenfield.

The Curator of Comparative Anatomy announced that the additions to the cabinet during the past year have been numerous and highly valuable, consisting in all of one hundred and thirty-eight specimens, among which may be particularly mentioned, —

1. The osteological collection of the late Dr. Lane, of this city.

2. A series of crania from Dr. Bryant.

3. A miscellaneous collection of bones from the Boston Marine Society.

4. A skull and nearly perfect skeleton of the Gorilla, from the Canna River, presented by Dr. Otis, of the navy.

5. An exceedingly valuable collection of bodies of animals, numbering twenty-six, chiefly the large cats, suffocated at the burning of the menagerie in Portland Street.

The Curator of Entomology reported the almost completed re-arrangement of the Coleoptera and Orthoptera of the Harris collection, and stated that the Hemiptera had been placed in the hands of Mr. Uhler, of Baltimore, for determination preliminary to re-arrangement; and portions of the Hymenoptera and Lepidoptera were being investigated by Mr. Norton, of Farmington, Connecticut, and Mr. Packard, of Brunswick, Maine.

The Curator of Ethnology announced that the collections, in reference to which the curatorship had been recently founded, included specimens of the arts and manufactures of North-west America, not only of the coast tribes near Puget Sound, but of those living far north; also, of the people of the Kingsmill Islands, of other islands in the Pacific, and of the East Indies proper; being monumental evidence of the conditions of these various people, when first visited by ships from the North Atlantic. These were all presented by the Boston Marine Society.

The Curators of Mineralogy, Botany, Ichthyology, and Herpetology, reported the safe transportation of their respective collections to the building now temporarily occupied, and their present satisfactory condition.

The Corresponding Secretary read letters from

The Société Royale de Zoölogie à Amsterdam, and the Leeds Literary and Philosophical Society, acknowledging the receipt of the Society's publications; from the Königliche Gesellschaft der Wissenschaften zu Göttingen, February 12, 1862, acknowledging the same and presenting its own publications; and from the Société Royale de Zoölogie à Amsterdam, presenting its Memoires.

The Nominating Committee reported a list of officers for the ensuing year.

The following gentlemen were then 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.

TREASURER,
THOMAS T. BOUVÉ.

LIBRARIAN,
CHARLES K. DILLAWAY.

CURATORS,

THOMAS T. BOUVÉ,	OF GEOLOGY AND MINERALOGY.
JOHN BACON, M.D.,	MINERALOGY.
CHARLES J. SPRAGUE,	BOTANY.
THOMAS M. BREWER, M.D.,	OÖLOGY.
HENRY BRYANT, M.D.,	ORNITHOLOGY.
F. W. PUTNAM,	ICHTHYOLOGY.
THEODORE LYMAN,	RADIATA.
J. C. WHITE, M.D.,	COMPARATIVE ANATOMY.
SAMUEL H. SCUDDER,	ENTOMOLOGY.
NATHAN FARRAND,	CONCHOLOGY.
B. J. JEFFRIES, M.D.,	MICROSCOPY.
F. H. BROWN, M.D.,	HERPETOLOGY.
CHARLES PICKERING, M.D.,	ETHNOLOGY.

CABINET-KEEPER,
CHARLES STODDER.

Prof. Agassiz, referring to the papers of Mr. Shaler and of Mr. Morse, recently published in the Proceedings, made a few remarks upon the homologies of Brachiopoda. He maintained that the two valves of these Molluscs are anterior and posterior, but at the same time that they are not homologous with the valves of Lamellibranchiates, and that the hinge of the Brachiopods is homologous to the stem of a Bryozoön. This he showed by comparing Lingula and a Bryozoön. In order to place them in a proper position for comparison, Lingula must be placed with the stem downwards, so that the hinge of the Brachiopoda comes on the opposite side, and at right angles to the position of the hinge in Lamellibranchiates when they are placed in their normal position for comparison. He then showed that this is not objectionable when we take into account such forms as Clavagella and similar Lamellibranchiates, and that we have the same symmetry between the two halves of the anterior and posterior valves which we find between the right and left valves of the Lamellibranchiates. From this it would follow that the foot of the Lamellibranchiates is homologous to the stem of a Bryozoön.

Mr. Scudder made some remarks upon the division of the class of Insects into orders, and its relations to other members of the branch of Articulates, on considerations drawn from the external integument of the animal. He showed that the different modes in which the plan of articulation is carried out are exhibited in Insects by a grouping together of the segments of which the body is composed into three distinct regions; in Crustacea, by a similar grouping, into two regions; while the worms show no regional distinction whatever. If a "region" be defined (among Articulates) as such a definite association of segments, in a more intimate relationship to one another than they exhibit towards other segments or association of segments, as is indicated more or less in the general contour of the body, and when accompanied by appendages, these applied to some special purpose, — then the so-called cephalothorax of Arachnids is, in reality, composed of two distinct regions, with the dorsal portions of the segments composing them, so closely united into a pseudo-cephalothoracic shield as to have caused them to have been generally considered as forming but a single region: while in the segments of the Myriapod, which bear no genuine legs, we have a more true cephalothorax than in the soldered front-body of the Arachnid, while, at the same time, there is in the Myriapod a front portion clearly separated from and freely movable upon the hind portion, the one homologous with the head of the Hexapod, and the cephalic portion of the pseudo-cephalothorax of the Arachnid; the other with the thorax of the Hexapod, and the thoracic portion of the pseudo-cephalothorax of the Arachnid. In the varied intimacy of the relationship existing between these three regions of the body, and the development of the segments composing them, we have three different degrees of complication of the Insect-structure, forming thus three natural orders: Hexapoda, Arachnida, and Myriapoda.

Mr. Putnam referred to the statements made by him at a previous meeting, in regard to the striped and spotted snakes, *Coluber ordinatus* and *sirtalis* of Linnæus, and said that he had this day received a letter from Mr. E. D. Cope, one of the first Herpetologists in the country, in which he stated that he considered the two so-called species as one, and that he had given the name of *Thamnophis ordinatus* to it. Mr. Putnam was still of the opinion that the species under consideration is generally identical with the European *Coluber natrix*, Linn.

Professor Agassiz said that in Europe, as in America, there is a spotted snake, which becomes striped, and is closely allied to our own. In the former country the striped variety is southern, the spotted northern; with us, the reverse is true. The European striped snake was first described by naturalists, and the generic name applied to that long ago must govern that of its representative *ordinatus* in this country. The nomenclature of American serpents, as given by Holbrook, had been much changed by some recent writers, but he thought we should yet return to the old system.

Mr. Gaffield exhibited beautiful specimens of crystallization occurring in masses of glass cooling slowly from a state of intense heat. The materials used in its manufacture were the Berkshire sand, soda ash, and lime. He had recently visited Germantown, where a bottle-glass factory was burned about a century since, and picked up upon its site a piece of an old crucible, which was found to contain these acicular crystals.

Dr. C. T. Jackson stated that he had analyzed the crystals, and had found them to be true crystallized glass.

Dr. J. H. Slack, of Philadelphia, and Mr. E. A. Boardman, of Milltown, Maine, were elected Corresponding Members of the Society.

Messrs. Henry Sayles, Henry U. Jeffries, R. S. Fay, Jr., and Dr. David Roberts, of Boston; Franklin Nickerson, and A. P. Cragin, of Cambridge, were elected Resident Members.

May 21, 1862.

The President in the chair.

Mr. C. A. Shurtleff was chosen Secretary *pro tempore*.

Dr. C. T. Jackson read the following notice of the death of Mr. Thoreau: —

Henry D. Thoreau, of Concord, Mass., died, at the age of 44 years, of pulmonary consumption.

His grandfather was a French emigrant from the island of Guernsey, and settled in Concord. His father was well known as a manufacturer of black-lead pencils, an art which young Thoreau learned, but never practised as a business, his tastes leading him wholly into the field of science, while he abhorred trade.

Henry D. Thoreau was distinguished for the great accuracy of his observations, and for the thoroughness with which he executed every research upon which he entered. He was esteemed as an accurate land surveyor, the only business upon which he ever entered for pay. As a botanist he was highly esteemed by those who are the best judges of the subject.

As an observer of the habits of animals he was unrivalled. He would wait all day, if it was necessary, for a bird to approach him. He said their curiosity would bring them to examine him if he would remain quiet long enough : and he generally managed to make familiar acquaintance with all living creatures he met with in his rambles through the forest. Thoreau had a genuine love of nature, and pursued natural history for his own gratification, and not with any ambitious views. He was greatly troubled to find that anything had escaped the observation of eminent naturalists, and seemed to be surprised that anything should have been left by them for him to discover.

Thoreau was a man of original genius, and very peculiar in his views of society and the ways of life. He was conscientiously scrupulous, and was opposed to aiding or abetting, even by a poll-tax, measures which he did not approve of, and therefore got into trouble occasionally with the constituted authorities of the town, who could not indulge him in his opposition to a tax because any part of it might go to support the militia ; so they twice shut him up in the jail, from whence his friends took him by paying his tax against his protest.

His published works are full of knowledge of the secrets of nature, and are enlivened by much quaint humor, and warmed with kindness towards all living beings. Those who knew Thoreau best loved and appreciated him most.

Dr. Jackson proposed the following resolutions, which were adopted : —

Resolved, That the Boston Society of Natural History has learned with profound regret the premature decease of their corresponding member, Henry D. Thoreau, of Concord, who was a most faithful and devoted student of nature, a keen and appreciating observer, whose researches, had longer life been granted him, promised important acquisitions to science.

Resolved, That a copy of this resolution be transmitted to the mother and sister of this eminent naturalist, with expressions of the warm sympathy of this Society in their great loss.

Dr. Jackson announced the donation of Mr. Thoreau's collections to the Society. These consisted of

1. His collection of New England pressed plants, numbering more than one thousand species, arranged by himself, together with those western plants collected in his journey of 1861.
2. His collection of birds' eggs and nests, carefully identified by himself, composed of New England species.
3. The collection of Indian antiquities, consisting of stone implements and weapons (chiefly) found by himself in Concord.

Dr. Charles T. Jackson read the following

REPORT OF THE COMMITTEE APPOINTED TO EXAMINE THE FROZEN WELL OF BRANDON, VERMONT.

The attention of the Boston Society of Natural History having been called to a communication published in the newspapers of this city, by John H. Blake, Esq., and to a statement communicated to this Society by that gentleman, a committee was appointed to investigate the phenomena in question.

This committee consists of John H. Blake, Esq., Prof. William B. Rogers, and Dr. Charles T. Jackson.

On the 23d of May, 1859, Uriah A. Boyden, Esq., of this city, liberally placed in the hands of the chairman of this committee the sum of three hundred dollars, to defray the expenses of their investigations.

On the 10th of June, 1859, Prof. Rogers being otherwise engaged, Messrs. Blake and Jackson proceeded to Brandon, taking with them the instruments required for their examination of the well, and of the geology and topography of the country around it.

In Brandon we received much valuable assistance from Mr. J. E. Higgins, and to him the care of the explorations made during our absence was intrusted, Mr. Blake occasionally visiting the place, and giving the requisite instructions.

The frozen well of Brandon is situated about half a mile west of Brandon Hotel, on the estate of Mr. Abraham Twombley. It was dug in the month of November, 1858, and stoned up with boulders of limestone rock soon after.

In excavating this well, the first strata were found to be sandy loam, then came coarse gravel, and a bed of rounded boulders, of sizes varying from that of a walnut to a foot or more in diameter, the spaces between the boulders being filled with fine clayey sand.

Twenty feet from the surface, the boulder bed and soil were found to be frozen, and lumps of frozen earth, with pieces of ice, were raised, some of the lumps of ice being of the size of a hen's egg. Frozen masses of the earth and lumps of the ice were taken away and exhibited in the village of Brandon.

All the lower portion of the boulder bed was frozen; but on passing through it to the sand below, liquid water was found, which flowed up into the bottom of the well. The whole thickness of the frozen bed was estimated at from twelve to fifteen feet.

Before making an examination of the well, which will be detailed presently, we explored the geology of the immediate environs, and measured the slopes of the hills, the thickness of the drift strata, and the nature of the loose rocks as well as of that of the rocky strata in place. We traced the gravel bed to its outcrop, four hundred and fifty feet north-west of the well, where it is fully exposed by excavations on the roadside, gravel being there dug for the mending of the roads of the town.

A sectional profile was made of the strata, and the distances were measured, and also the thickness of the deposits.

The rocky basis on which the drift reposes is a blue limestone, the surface being much worn and striated by drift action, and an abundance of erratic boulders of granite and quartz are scattered over its surface; these erratic rocks being all strangers in the region, and having been brought from a more northern part of the country.

A section of the cliff on the roadside shows at its base what is called "the gravel bed," made up of erratic boulders. This stratum is six feet in thickness.

Over this is a bed of gravel proper, one foot thick; then we come to a stratum of sand two feet in thickness, over which is a layer of the ordinary sandy soil, mixed with mould.

The top of this cliff, which is called "The Hog Back," is forty-five feet above the top of the well, and slopes towards it at an angle of six degrees, and is four hundred and fifty feet from it.

From the dip of the strata it is evident that the gravel bed passes through the bottom of the well, and from the other wells on both sides we learn that this gravel bed does not go through or under them, and that it is quite a narrow belt.

After making a rapid survey of the country around, we returned to the frozen well, and made more particular explorations. On measuring its depth, it was found to be thirty-four feet four-tenths, and there was two feet four inches of water in the well, while around the bottom of the stone walling of the well was a thick rim of solid ice, a hole large enough for a bucket only remaining open, as it had been cut during the past winter.

The well is three feet in diameter, and over it is placed a slab of marble, with a circular opening in it eighteen inches in diameter, with a curb windlass and a cover to the latter, to preserve the rope from rain.

A boy, son of Mr. Twombley, who had been in the habit of descending into the well daily to cut open the ice in the winter months, was sent down the well, by means of the bucket and rope, a candle being lowered down also to light the well, and to show where the ice rim existed.

It was found to be a few inches above the surface of the water, and to extend up the sides of the well about five feet, while a well-marked rim of ice projected out over the water, and was about eight inches thick. On this the boy stood, and with a hatchet cut away masses of the ice, and sent them up in the bucket for our examination.

The temperature of the water in the well was 0.5° centigrade, or $32\frac{9}{10}°$ Fah.* The temperature of the air in the well near its bottom was 2° centigrade, or $35\frac{6}{10}°$ Fah. That of the air on the surface was $9\frac{1}{2}°$ centigrade, or $49\frac{1}{10}°$ Fah.

On measuring the temperature of a spring just outside of the gravel bed, we found it to be 11° centigrade, or $51\frac{8}{10}°$ Fah.

A well belonging to Mr. Strong, a few hundred yards east of Twombley's, was found to be fifteen feet deep, and the temperature of the water was 8° centigrade, or $46\frac{4}{10}°$ Fah.

June 11th. — This morning we renewed our labors, re-examining the wells in the neighborhood on all sides of the frozen well.

Twombley's well had this morning precisely the same temperature it had yesterday, viz., 0.5° centigrade, while that of the air was at 10° centigrade, or 50° Fah.

Mr. Clarke's well, in a field north-west of the boulder bed, and not far from it, had a temperature of 6° centigrade, or $42\frac{8}{10}°$ Fah.

A spring south-west of the frozen well, and not far distant, had a temperature of 9° centigrade, or $48\frac{2}{10}°$ Fah.

None of the other wells in the town freeze in the winter, or are remarkably cold. It is evident, therefore, that the geological formation around the frozen well determines its freezing character, and that the gravel bed, in some way, causes the water in that well to freeze, and to continue frozen through the summer months.

It was therefore decided that a shaft or pit should be sunk on the gravel or boulder bed, and a point half way between the frozen well and the top of "Hogback" was selected as the location: but Mr. Twombley

*All the measurements of temperature were made with centigrade thermometers, which had recently been carefully verified as to their zero points. We give the temperature also reduced to Fah. scale.

was unwilling to have a pit sunk there, as he cultivated the field, and had a crop of potatoes growing on it at the time.

We left Mr. Higgins to make the proper arrangements for the explorations called for, and to obtain from the Brandon Iron Company some miners, to whom the excavation could be safely intrusted.

Mr. Blake visited the works from time to time, as his advice was needed.

The first pit was sunk in the garden, seventy feet south-east of the frozen well, to the depth of twenty-nine feet. The strata were found to be clay and sand near the surface, and the lower part consisted of gravel and boulders. No frozen strata were found. After examining the results of this digging, we decided to make an opening west of the well, and Messrs. Blake and Higgins obtained permission of the selectmen of Brandon to sink a pit on the roadside. This was found to be very difficult ground to excavate, requiring much skill on the part of the miners to prevent accidents from falling in of the walls of the pit: double timbering and planking being needed to support the walls.

This excavation gave more satisfactory results: for the moment the gravel and boulder bed were struck, they were found to be very cold, and near the bottom of the bed frozen earth was found. This was in the month of October, when the summer heat had penetrated as far as possible into the earth. We chose that time expressly for the purpose of ascertaining whether the surface heat ever reached the bottom of this frozen bed.

JULY 2D, 1861. — Messrs. Blake and Jackson revisited Brandon and re-examined the frozen well and the pit which had been dug by the roadside.

The temperature of the water in the well was found to be 33° Fah., and that of the air around 62° Fah. A rim of ice, three feet above the liquid water in the well, and one foot in thickness, then existed, attached firmly to its walls. The bottom of the well feels, by the sounding-lead, as if it was covered with solid ice: but we could not obtain any from the bottom, owing to the want of suitable tools for breaking it up, but gave directions to have the fact ascertained under Mr. Higgins's superintendence.

We sent the miners down into the pit which they had sunk and covered up carefully with shavings, to prevent alteration of temperature, and had the pit re-opened, and the bottom dug into. A thermometer, in its tin case filled with water, was buried in the cold earth at the bottom of the pit, and allowed to remain some hours, after which it was taken out, and the temperature was found to be $42\frac{8}{10}$° Fah. This stratum when first dug into was frozen: hence the summer heat had penetrated to some extent since the shaft was sunk, in spite of all the precautions which had been taken to prevent it.

Enough was proved, however, to satisfy us that our conjecture respecting the influence of the boulder bed, in causing the freezing of the well, was sustained.

Extract from Mr. Blake's notes, Oct. 25, 1859: —

"During the past summer there remained in the cold well at Brandon, until about the 10th of August, a ring of ice upon the curbstones, formed by the surface water trickling down and freezing, indicating thereby a temperature below 32° Fah. This ring of ice was near the surface of the water in the well, and was several inches in thickness. Ice also formed above it, upon the stones, of lesser thickness, to the height of about four and a half feet.

At this time a party visited the well, one of whom descended and broke off all the ice, and for about a fortnight after, or until about the 23d of August, lumps of ice were occasionally drawn up in the bucket with the water. Since that time there has been no ice seen. The temperature of the water gradually increased to 40° Fah. At this time, Oct. 22d, it is 38° Fah.

During the summer the well received numerous visitors. One of the committee was there many times during June, July, and August. One of the warmest days of the past summer he drew ice from the well; the temperature of the air at the time in the shade was 93° Fah.

On the 30th of August was commenced a shaft, seventy feet distant from the well, in a south-easterly direction. The first two feet was through very tough and compact clay; the next three feet was through very fine silicious sand; then loose gravel and cobble stones from the size of an egg to a half barrel, for the distance of four feet; through this the stones were encrusted, for the most part on the under side, with carbonate of lime.

On the 4th of September, at 7½ o'clock, A. M., the shaft had been sunk twelve feet. The temperature of the earth in the bottom was 50° Fah.; that of the air at the surface at the same time was 60° Fah. On the 7th of September a depth of fifteen feet was attained, and at 7 o'clock, A. M., the temperature of the earth at the bottom was found to be 46° Fah.; that of the air at the surface 52° Fah. On the 13th, a depth of twenty feet having been reached, the temperature of the earth in the bottom was found to be 48°; that of the air at the surface at the time 54° Fah. On the 17th, at the depth of twenty-six feet, the earth in the bottom of the shaft indicated the same temperature as on the 13th. On the 20th, at the depth of twenty-nine feet, found water, and discontinued further sinking. The temperature of the water was 46° Fah.; the air at the surface at the time was 52° Fah. The temperature in the cold well was taken at the same time, and found to be 40° Fah. The character of the gravel in this shaft remained the same till the last foot was reached, in which there was a mixture of clay. The shaft was now filled with the material which was thrown out.

On the 28th of September a new shaft was commenced, about seventy feet from the cold well, in a north-westerly direction. Found gravel and cobble stones at the surface, which continued mixed with water-worn boulders to the depth of thirty-four feet, when the work was discontinued. This gravel was a little finer than that in the shaft previously sunk, and more like that passed through in digging the cold well. The stones were encrusted through a part of the distance with carbonate of lime as before mentioned, but much less than in the other shaft.

During the time occupied in sinking this shaft to the depth of twenty-six feet, the temperature of the air was less and less, — "the weather growing colder." The average temperature of the atmosphere was 47.011° Fah. The temperature in the bottom of the shaft was uniformly 46° Fah., and on the 19th of October, at the depth before named (twenty-six feet), no ice had been found.

On the 20th the workmen reached a depth of twenty-nine feet, and found a stratum of frozen earth (gravel) about two inches thick. No more frost was seen this day. On the 21st they sunk to the depth of thirty-one feet, and found a stratum of frozen ground about eight inches thick, below which no frost was found that day. The day following (22d) reached a depth of thirty-three feet, and found the ground frozen solid and hard to break with the pick.

The workmen supposed this to be only a crust or thin stratum of frozen ground, such as they had before encountered; but it continued solid all day, during which they sunk only one foot.

In the afternoon Mr. Higgins, who kindly volunteered his services of supervising the work of sinking both of the shafts referred to, visited the shaft in company of E. N. Briggs, Esq., and drew up from the bottom, after removing some loose gravel which had caved down from above, a bucketful of frozen ground, in which appeared clear ice in streaks, and in the interstices of the gravelly mass, clearly perceptible. Some of this frozen earth and ice was taken to the village, and exhibited to many persons before it had time to melt. The temperature of the air this day, October 24th, was in the morning 47° Fah., at 3 P. M. 52° Fah., at 5 P. M. 48° Fah. During the night previous, water froze slightly on the surface; but in some post-holes, eighteen inches deep, recently dug in the same neighborhood and containing water, no ice formed.

The lowest depth reached in this shaft was thirty-four feet. The men before leaving tried to drive an iron bar thorough the frozen ground in the bottom without success, it being frozen too deep and too solid.

The shaft was then covered over with plank, and upon the plank shavings were placed, to intercept communication as much as possible between the shaft and the external atmosphere.

A few rods north-easterly from the gravel ridge in which the cold well and the two shafts were sunk, two wells have been sunk during the summer, both through compact clay with narrow seams of fine sand. One of them, about fifteen feet deep, contains water; the other, about forty feet deep, is dry."

Although we do not feel that we have been able to remove all doubts as to the true theory of the phenomena of the frozen well, still we incline to believe that the freezing is due to the nature of the conducting medium in which the well exists, and that the wave of heat in the summer months is not adequate to overcome the cold of the longer cold months, while the uncommonly severe winters of 1856 and 1857 may have lowered the temperature of the rocky masses of boulders, so that the wave of summer heat has not yet been able to reach the frozen mass, which, once congealed, would resist thawing on account of the slow conduction of ice. It should also be remembered that water does not conduct heat downward readily, though it does upward by convection.*

The existence of beds of boulders in other cold and frozen wells, as in the one of Tioga, N. Y., seems to point to the same solution.

The ice in the Brandon well forms some time in November, and it remains until September, thus showing only a brief period when the temperature of the bottom of the well is above the freezing temperature, while the great mass of boulders remains much below it; the well, being more exposed, receives the first warmth by conduction of its walls exposed to the air.

Among the hypotheses which have been offered to account for the phenomena of the frozen wells, are the following: —

1st. — The penetration of cold currents of air through the boulder stratum. This hypothesis is without any foundation, because there are no open spaces, and the boulders are closely cemented together by being imbedded in clay and sand; and also because the fact is ascertained, that there are no currents of air moving in the mass, or

* The familiar experiment of boiling water upon the surface of a cake of ice without melting it, and that of boiling water at its surface, by means of a plate of hot iron placed over it, while the water below is not heated, illustrates this statement.

It is true that the maximum density of water is at 39° Fah., and that it sinks when at this temperature in water that is either warmer or colder, but this movement is limited to a few degrees of temperature. Ice, having its particles fixed, does not allow of the varying of heat by convection, as it is called, and is a very bad conductor of heat, as is obvious to all who observe a cake of it exposed to a warm atmosphere.

in the well, the flame of a candle placed near the stony walls not being in the least deflected.

2D. — The descent of cold air into the well, in mid-winter, communicating the degree of cold to the walls of the well.

This conjecture is insufficient, since the ice existed before the well was sunk, and when there was no opening for the air to descend into. This fact was not only ascertained at the time the well was sunk, as witnessed by credible persons residing in the vicinity, but has also been fully verified by sinking a shaft into the boulder bed by this committee, and by the discovery of an extensive frozen stratum in October.

3D. — Radiation from the bottom of the well.

If this conjecture was well founded, other wells in the vicinity, many of which are more favorably situated for such radiation, should also be frozen; and yet such is not the case, and they never do freeze in the coldest winters.

4TH. — It has also been imagined that some natural freezing mixture exists in the frozen strata, or in the water of the well.

This is not the case; the water being exactly like that of other wells in the neighborhood, and the boulder bed containing nothing but rocks, clay, and sand.

5TH. — That this boulder bed is the moraine of an ancient glacier, the ice and cold of which still remains. We doubt not that the boulders were rounded and accumulated by the action of moving ice; but it would appear improbable that ice should remain for many thousands of years, when liquid water exists both above and below this mass of drift, and percolation of warmer water is constantly taking place from the surface, and it is also introduced from below quite freely.

6TH. — The well having been stoned up in the latter part of November, it has been supposed that the stones were very cold when placed in the well, and that they have retained their low temperature ever since, and thus, by conducting the heat away from the water in the well, they have caused it to freeze.

On this hypothesis one observer predicted that "our curiosity would soon disappear," as the equilibrium of temperature would soon be restored between the water and the walls of the well. This hypothesis has required the committee to leave the question to be solved by time, and three years have passed, with the regular recurrence of the icy belt, and its equally regular disappearance in the autumn. Now, if it was the original coldness of the stones in the well that caused the ice to form, when those stones were once warmed above the freezing point, they ought never again to fall below it and cause the congelation of the water. The doubts which this observer entertained of the correctness of the history given by the citizens of Brandon as to the existence of ice when the well was first dug are now dissipated by the direct researches of this committee, and by the actual discovery of the frozen stratum, and of bands of clear ice seventy-two feet west of the well, in the strata of boulders and clay. This fact, witnessed by one of the committee, and by numerous respectable gentlemen of Brandon, is now placed beyond a doubt.

Since it appears that the nature and situation of the strata of earth, gravel, and boulders around this well, causes the low temperature of the winter months to be preserved in the well through the summer, it is probable that, by imitating this condition of things in the construction of a well in a similar region, we could make a well that would freeze in the winter, and retain its frozen condition through the summer. The experiment might require two or three years for its fair trial, in order to afford time for the translation of the waves of heat.

By correspondence with Mr. George Sidney Camp, of Tioga, we have learned all that can be now known concerning the frozen well of that place, and also that, its walls having caved in, it would be useless for the committee to visit the place, since no additional information can be now obtained without a reconstruction of the well, which would be quite expensive, its depth being more than seventy feet, and it having been excavated in a stratum of boulders like those of the Brandon frozen well.

We think that the causes assigned as those which effected the freezing of the well in Brandon are equally applicable to that at Tioga.

The same theory will apply to the cold wells in Connecticut, which are at a temperature below the mean of the climate of that State, and yet do not freeze.

It is hardly necessary to add, that the occurrence of ice in iron mines and caves where snow drifts abundantly into them, is not similar to the case of the Brandon well; and the occurrence of masses of ice under the shadow of crags of rocks, as at Granville, Nova Scotia, and of sheets of ice below the turf in Isle Royale, Lake Superior, are also of a different class, and require a different explanation from those applicable to frozen wells. Hence we do not feel called upon to enter upon the explanation of these phenomena at this time.

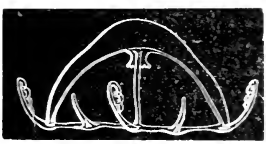
The committee are under obligations to David Buckland, Esq., for elaborate tabular statements of the monthly mean temperature of Brandon, from 1853 to 1861, inclusive. They regret to state that, owing to the burning of his house, all the tables he kept for the past year are lost, with the exception of that for the month of November, 1861. These tables are appended to this report.

second set; the tentacles which then may make their appearance at whatever point of the circumference it may be, and however irregularly they may divide the existing spaces between the tentacles, would be the tentacles of the third set, and so on for the other tentacles. Although in some of the families, as the *Laodiceæ* AG., the *Eucopidæ* GEGENB., the *Nucleiferæ* LESS., the *Melicertidæ* AG., I have found that the order of appearance of the different tentacles coincided with the order of appearance of the chambers of Polyps; yet the exceptions to this law were numerous, as in the *Tubularidæ* AG., the *Bougainvillidæ* LÜTK. the *Nemopsidæ* AG., the *Berenicidæ* ESCH. In one and the same family we find genera in which the law holds good, while in closely-allied forms the order of development is materially modified, as is the case in *Clytia* and in *Tiaropsis*.

Another great difference between the Polyps and Acalephs is the great variety of numbers which are found in the tentacles of the first set in Acalephs, while in Polyps six is almost uniformly the number of chambers of the first cycle. In Acalephs, on the contrary, we find in some *Eucopidæ* sixteen, *Obelia* (fig. 5), in others, *Eucope* (fig. 7), twenty-four, and forty-eight (fig. 6), as the number of tentacles of the first set; in the *Oceanidæ* ESCH., as limited by Agassiz, there are four in *Clytia* (fig. 14), *Eucheilota* (fig. 16), and *Tiaropsis* (fig. 10); in the *Laodiceæ*, there are four in *Staurophora* (fig. 1), and two in *Laphœa* (fig. 4). Among the *Berenicidæ* there are four (see *Willia*); the *Nemopsidæ* have sixteen (fig. 26), while the *Bougainvillidæ* have eight, as in *Bougainvillia* (fig. 24), or four as in *Lizzia* (fig. 28). In some of the Tubularians, as in *Corymorpha* (fig. 31), and *Hybocodon* (fig. 30), the first set has but one tentacle. This shows, among the few Medusæ which I have examined, a greater variety of modes of development than we find in the whole class of Polyps, as far as they are known.

In *Staurophora laciniata* AG., I have followed this succession of the sets of tentacles as far as the seventeenth set. The first set consists of four tentacles, and perhaps only of two if we may form conjectures from the young Medusa of *Laphœa* mentioned below.

FIG. 1.

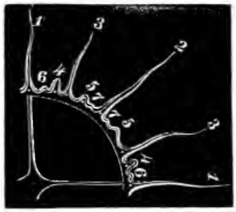


Young *Staurophora laciniata*, magnified 10 diam.

In fig. 1 we have a young *Staurophora*, measuring about $\frac{1}{20}$ of an inch across the circular tube, in which the second set of tentacles is developed. The digestive cavity hangs down as a short proboscis; there are no ovaries developed. The formula of the tentacles for a quarter segment, at the stage of growth of fig. 1, could be represented by T_1: t_2. T_1: — T_1. T_1, being the tentacles of the first set, placed in the prolongation of the chymiferous tubes

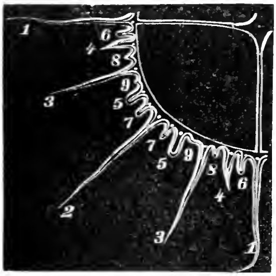
t_2, the tentacles of the second set, half-way between those of the first set. Fig. 2 is a more advanced stage of *Staurophora*, in which the tentacles of the third set are almost as large as those of the first and second sets, and the fourth, fifth, and sixth sets of tentacles can readily be distinguished. Using the same notation as above, the formula for the tentacles would be: T_1, t_6, t_4, t_3, t_5, t_7, t_2, t_7, t_5, t_3, t_4. t_6, T_1. In fig. 3, the young *Staurophora* has a still greater number of sets of tentacles, the fourth and fifth sets having grown sufficiently large to be easily distinguished from one another by their difference in size; the eighth and ninth sets have made their appearance. The formula for this stage of growth is: T_1, t_6, t_4, t_8, t_3, t_9, t_5, t_7, t_2, t_7, t_5, t_9, t_3, t_8, t_4, t_6, T_1. The number of tentacles of the first set are four ($4T_1$); there are in the second set also four ($4\ t_2$), using the same notation; there are in the third set $8\ t_3$; in the fourth set $8\ t_4$; in the fifth set $8\ t_5$; in the next set $8\ t_7$; then $8\ t_8$, and $8\ t_9$ in the ninth set. The number of tentacles which *Staurophora* may have at any particular time can easily be found, and the formulæ for the number of tentacles in figs. 1, 2, 3, would be:

FIG. 2.



Young *Staurophora* slightly older than fig. 1.

FIG. 3.



Young *Staurophora*, still older than fig. 2.

$$\Sigma\, t = 4\ T_1 + 4\ t_2;$$ or 8 tentacles for fig. 1,

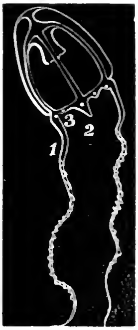
Σ t denoting the sum of the different sets of tentacles round the circumference;

$$\Sigma\, t = 4\ T_1 + 4\ t_2 + 8\ t_3 + 8\ t_4 + 8\ t_5 + 8\ t_6 + 8\ t_7$$ for fig. 2, or forty-eight tentacles; and, finally,

$$\Sigma\, t = 4\ T_1 + 4\ t_2 + 8\ t_3 + 8\ t_4 + 8\ t_5 + 8\ t_6 + 8\ t_7 + 8\ t_8 + 8\ t_9,$$ or sixty-four tentacles in fig. 3; and so on as far as the seventeenth set. It becomes almost impossible to follow the development of the tentacles further, as they are then rather irregular in their growth, and often much more numerous in one quarter segment than in the adjoining one. In fig. 3, we have the first sign of the development of the ovaries, the corners of the digestive cavity extend, little by little, along the chymiferous tubes, and when the young Medusa has attained the size of an inch in diameter, the ovaries already reach half-way towards the circular tube. For

a figure of the adult Medusa, see Agassiz (L.) in Mem. American Academy, Vol. IV. Plate 7. The only species of the *Laodicea* Ag. which I have found young enough to show positively what the number of tentacles of the first set was, is the Medusa of *Laphœa cornuta* Lamx., fig. 4, in which the formula for the tentacles for half the circumference is, T_1, t_3, T_2, t_3, T_1; the presence of eight tentacles at that time is expressed by the formula $\Sigma\ t = 2\ T_1 + 2\ T_2 + 4\ t_3 = 8\ t$. This species is closely allied to *Atractylis repens* Wright, and I am inclined to believe that both may prove to be the young of *Laodicea-like* Medusæ. It will be very interesting to see how this order of succession of the sets of tentacles is modified in *Laodicea calcarata* A. Ag., in which we have cirri, and club-shaped bodies between the tentacles, as in *Thaumantias mediterranea* Gegenb. Unfortunately I did not succeed in finding any Laodicea calcarata young enough to throw any light on this subject; from the youngest specimen I met with, I am convinced that the first set of tentacles does not consist of more than four, or perhaps even only of two tentacles, specimens measuring one quarter of an inch in diameter having not more than seven tentacles between every two chymiferous tubes.

Fig. 4.



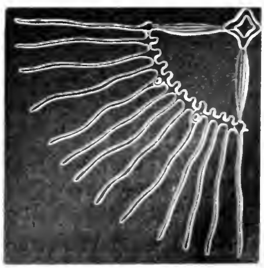
Free Medusa of *Laphœa cornuta*, magnified 15 dia.

In the *Eucopidæ* Geg. we find a much greater difference in the number of tentacles of the first set. In *Obelia commissuralis* McCr., fig. 5, there are sixteen tentacles in the first set. In *Eucope diaphana* Ag. (see fig. 7), and in two other species closely allied to it, the first set consists of twenty-four tentacles; in another Hydroid belonging to this family we find a young Medusa escaping from the reproductive calycle with no less than forty-eight tentacles, as in fig. 6, which represents a quarter segment of a new species of *Eucope?* We know nothing of the adult condition of *Obelia*, fig. 5, and of the Medusa of fig. 6. But as we have no less than three species of *Eucope* on our coast, all escaping from the reproductive calycles with twenty-four tentacles, and as we now know several species of *Obelia*, all having sixteen tentacles in the first set, and still another, fig. 6, in which the first set has forty-eight tentacles, this difference in the number of tentacles of the first set would seem to be generic.

Fig. 5.

Obelia commissuralis

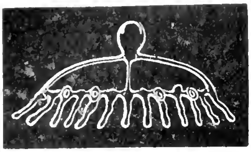
Fig. 6.



Eucope?

Eucope diaphana AG. is the only one of this family which I have followed from the time of its escape from the calycles to the adult state. The young Medusa is liberated with twenty-four tentacles, fig. 7; its formula would be $T_1, t_1, t_1, t_1, t_1, t_1, T_1$, or, for the number of tentacles of the first set:

FIG. 7.

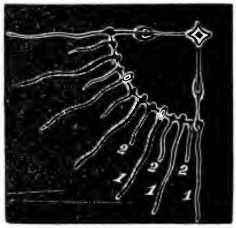


Young *Eucope diaphana*.

$$\Sigma\, t = 4\ T_1 + 20\ t_1 = 24\ t.$$

In fig. 8, we have the same Medusa at the time when the second set is developed. The formula of fig. 8 is therefore,

FIG. 8.



Older *Eucope diaphana*.

$$T_1, t_2, t_1, t_2, t_1, t_2, t_1, t_2, t_1, t_2, t_1, t_2, T_1,$$

or, for the whole number of tentacles:

$$\Sigma\, t = 4\ T_1 + 20\ t_1 + 24\ t_2 = 48\ t,$$

and so on, as far as the fifth set of tentacles, fig. 9.

The formula for the third set is:

$$\Sigma\, t = 4\ T_1 + 20\ t_1 + 24\ t_2 + 48\ t_3 = 96\ t;$$

that of the fourth set:

$$\Sigma\, t = 4\ T_1 + 20\ t_1 + 24\ t_2 + 48\ t_3 + 48\ t_4 = 144\ t;$$

that of the fifth set (fig. 9):

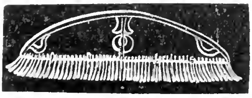
$$\Sigma\, t = 4\ T_1 + 20\ t_1 + 24\ t_2 + 48\ t_3 + 48\ t_4 + 48\ t_5 = 192\ t.$$

The formula for the arrangement of the tentacles for this last set being (fig. 9),

$$T_1, t_4, t_3, t_5, t_2, t_5, t_3, t_4, t_1, t_4, t_3, t_5, t_2, t_5, t_3, t_4, t_1, t_4, t_3, t_5, t_2, t_5, t_3, t_4, t_1, \ldots\ldots\ldots\ldots T_1.$$

Fig. 9 is an adult *Eucope diaphana* AG., measuring one quarter of an inch in diameter; at the stage represented in fig. 7, it is not much larger than a pin's head.

FIG. 9.



Adult *Eucope diaphana*.

In the *Oceanidæ* ESCH., the presence of eyes between the tentacles, and the development of cirri at the base of the tentacles in some of the genera, modify the uniformity of the order of succession of the sets of tentacles.

In *Tiaropsis diademata* AG. (Mem. American Academy, Vol. IV. Plate 6), we find two compound eyes between every two chymiferous tubes, the eyes being placed at the same distance from the chymiferous tubes as that at which they are placed one from the other. In the youngest *Tiaropsis* which I have found, fig. 10, there were already twenty-four tentacles, four long tentacles in the prolongation of the chymiferous tubes, four slightly shorter in the middle of the space between the eyes, and two pairs of small tentacles, one pair for each eye. So that we should have for the formula of the tentacles of fig. 10: T_1, t_3, e, t_3, t_2, t_3, e, t_3, T_1; e being the compound eye. The third set, which would have fallen on the spot occupied by e, consists of a pair of tentacles, instead of a single one only, as in the former cases.

Fig. 10.

Young *Tiaropsis diademata*.

Fig. 11 is a diagram of the arrangement of the tentacles, between two chymiferous tubes, in the stage of growth of fig. 10. When we come to the next stage, represented in fig. 12, the order of succession is not interfered with by the eyes, and we have for the formula of the arrangement of the tentacles:

Fig. 11.

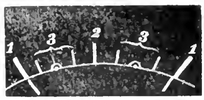
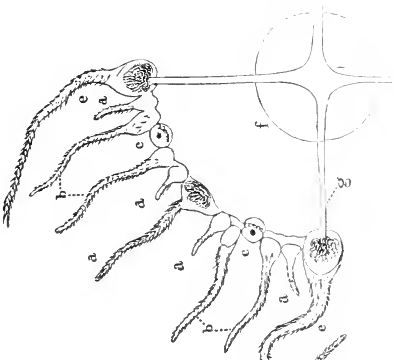


Fig. 12.

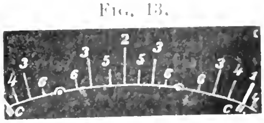


Tiaropsis, having forty tentacles.

$$T_1,\ t_4,\ t_3,\ e,\ t_3,\ t_5,\ t_2,\ t_5,\ t_3,\ e,\ t_3,\ t_4,\ T_1.$$

The fourth and fifth sets consist only of eight tentacles each, and not of sixteen, as the third set. When we come to the next set, the sixth, we find that it has sixteen tentacles, and that two pairs of tentacles are formed, one for each eye, as is shown in the diagram, fig. 13, and so on; every set which would have come in the space occupied by an eye being always formed in pairs, as was the case with the third and the sixth sets. The formula for this figure (fig. 13) would be:

Fig. 13.



$$T_1,\ t_4,\ t_3,\ t_6,\ e,\ t_6,\ t_3,\ t_5,\ t_2,\ t_5,\ t_3,\ t_6,\ e,\ t_6,\ t_3,\ t_4,\ T_1.$$

The formula for the number of tentacles of fig. 10 is:

$$\Sigma\,t = 4\,T_1 + 4\,t_2 + 16\,t_3 = 24\,t.$$

For fig. 12 the formula is:

$$\Sigma\,t = 4\,T_1 + 4\,t_2 + 16\,t_3 + 8\,t_4 + 8\,t_5 = 40\,t.$$

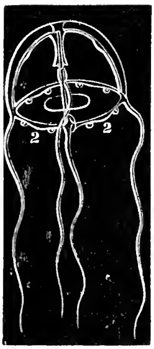
For fig. 13 the formula becomes:

$$\Sigma\,t = 4\,T_1 + 4\,t_2 + 16\,t_3 + 8\,t_4 + 8\,t_5 + 16\,t_6 = 56\,t.$$

The presence of eyes does not always modify in such a remarkable manner the order of succession of the sets of tentacles. For instance, in *Clytia bicophora* AG. (see also NOTE A, p. 95), we have two eyes between every two chymiferous tubes, and yet the order of succession is as regular as if the eyes had not been present. Fig. 14 is a young *Clytia*, just escaped from the calycle, having four long tentacles and four rudimentary ones, 2 (fig. 14), and the eyes placed on each side of the middle tentacle; the formula for the arrangement of the tentacles is:

$$T_1,\quad e,\quad t_2,\quad e,\quad T_1.$$

FIG. 14.

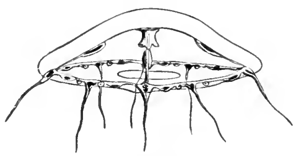


Clytia bicophora.

In fig. 15, the tentacles of the third set having made their appearance, the formula becomes:

$$T_1,\ t_3,\ e,\ t_2,\ e,\ t_3,\ T_1.$$

FIG. 15.



Young *Clytia bicophora.*

The formulæ for the number of tentacles for figs. 14 and 15 are respectively:

$$\Sigma\,t = 4\,T_1 + 4\,t_2 = 8\,t, \text{ and } \Sigma\,t = 4\,T_1 + 4\,t_2 + 8\,t_3 = 16\,t.$$

This Medusa has not been traced farther. I am unable, therefore, to say whether the succession of the following sets is regular or not. In the genus *Eucheilota* of McCrady, in which we have eyes and cirri, the following is the order which has been observed: the youngest *Eucheilota* (probably *Eucheilota ventricularis* MCCR.; for figure of the adult see McCrady, Proc. Elliot Soc., Plate XI. fig. 3) had four long tentacles, and resembled the young of *Clytia*, fig. 14, so closely that it was at first mistaken for it. More advanced

FIG. 16.

Young *Euchei-lota.*

FIG. 17.

Eucheilota, more advanced than fig. 16.

specimens, fig. 16, showed at the base of the large tentacles slight swellings, which soon developed into short cirri as seen in fig. 17, in which the cirri of the second set of tentacles are also slightly developed. The formula for the youngest *Eucheilota* thus far seen is:

$$T_1, \quad e, \quad t_2, \quad e, \quad T_1.$$

The formula of fig. 16 is:

$$\overbrace{T_3, \; T_1, \; T_3}, \quad e, \quad t_2, \quad e, \quad \overbrace{T_3, \; T_1, \; T_3},$$

and that of fig. 17 is:

$$\overbrace{T_3, \; T_1, \; T_3}, \quad e, \quad \overbrace{t_4, \; t_2, \; t_4}, \quad e, \quad \overbrace{T_3, \; T_1, \; T_3},$$

the third and fourth sets of tentacles being the cirri of the tentacles of the first and second sets; so that the cirri are developed before any additional sets of tentacles are added, the formulæ for the number of tentacles of these successive stages being:

$$\Sigma \, t = 4 \, T_1 + 4 \, t_2 = 8 \, t.$$

$$\Sigma \, t = 4 \, T_1 + 4 \, t_2 + 16 \, T_3 = 24 \, t.$$

$$\Sigma \, t = 4 \, T_1 + 4 \, t_2 + 16 \, T_3 + 16 \, t_4 = 40 \, t.$$

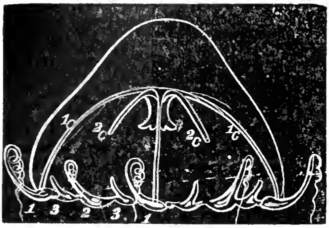
Among the *Geryonopsidæ* AG. I have found our *Tima formosa* AG., with sixteen long tentacles and sixteen shorter ones, the formula being probably:

$T_1, \; t_4, \; t_3, \; t_5, \; t_2, \; t_5, \; t_3, \; t_4, \; T_1$; as *Tima* never has many tentacles it is possible that the young *Tima* have not more than four, or perhaps two tentacles in the first set. The *Æquoridæ* will give us the best means of ascertaining the order of development of the chymiferous tubes, and of the tentacles in connection with numerous eyes between the tentacles, as these Medusæ attain quite a large size before the chymiferous tubes become numerous. From what I have seen in the *Berenicidæ* ESCH., the *Melicertidæ* AG., and the *Æquo-*

NOTE A.—The genus *Wrightia* has but two tentacles when the Medusa escapes from the calycles. I have traced the Medusa of our young *Wrightia*, mentioned by Prof. Agassiz on p. 354 of his 4th vol. of Contributions to the Natural History of the United States, through all the stages intermediate between *Wrightia* and *Oceania*, and have ascertained that our *Wrightia* is only the young of *Oceania languida* A. AG. described in p. 353 of the same volume. It has at first two long tentacles, then four, in the prolongation of the chymiferous tubes, then eight, sixteen, and finally thirty-two tentacles. The eyes are developed independently of the tentacles; one pair of eyes making its appearance for each tentacle.

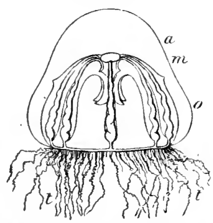
ridæ Esch., it appears that the new chymiferous tubes are always formed from the base of the digestive cavity towards the circular tube, the tentacle which is eventually placed in the prolongation of the chymiferous tube being always first developed, before any trace of the chymiferous tubes can be found, so that the new chymiferous tube strikes the tentacle, instead of the tentacle arising from the tube. Fig. 18 is a young *Melicertum Campanula* Per. et Les., of which fig. 19 is the adult. In fig. 18 there are only four of the eight chymiferous tubes which reach the circular tube; the others, ${}^2c$, ${}^2c$, only extend a short distance, while the tentacles 2, which will, in later stages of growth, be found in the prolongation of these tubes, ${}^2c$, are quite well developed. The formula for the tentacles of fig. 18 is: T_1, t_3, t_2, t_3, T_1, which soon becomes T_1, t_4, t_3, T_2, t_3, t_4, T_1; the chymiferous tubes ${}^2c$, ${}^2c$, having reached the circular tube at the point 2, fig. 18. The mathematical accuracy of the meeting of the tentacle and its chymiferous tube is still more striking in Willia. In a young *Willia ornata* McCr. there are four straight chymiferous tubes which do not branch, four long tentacles in the prolongation of these chymiferous tubes, and four tentacles which are not placed in the middle of the space between two adjoining chymiferous tubes, but always in such a position that, either to the right or the left, the distance to the nearest chymiferous tube is one-third of the space between two adjoining chymiferous tubes. In fig. 20 the simple tube is sending off a small branch, ${}^2c$, which will, in the end, strike the circular tube at the point where the tentacle 2 is placed. The formula for the tentacles in fig. 20 being: T_1, t_2, T_1, and after the branch of the chymiferous tube has reached the margin it will become: $\overbrace{T_2\ T_1}$, $\overbrace{T_1\ T_2}$ for half the circumference; T_1 indicating the tentacle in the prolongation of the main tube; T_2 the tentacle of the first branch; the $\frown$ joining the two letters T_1 T_2 shows that the branch T_2 is a part of the same chymiferous tube

Fig. 18.



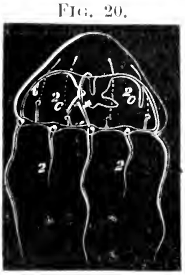
Young *Melicertum Campanula.*

Fig. 19.



Melicertum Campanula.

Fig. 20.

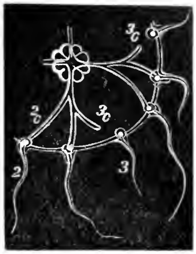


Young *Willia ornata.*

with T_1; the same applies to T_3. Soon after the tentacles of the third set make their appearance, and in fig. 21 the formula is:

$$t_3,\ \overbrace{T_1,\ \mathrm{T}_2},\ t_3,\ \overbrace{T_1,\ \mathrm{T}_2},\ \text{or, } \Sigma\, \mathrm{t} = 4\,\mathrm{T}_1 + 4\,\mathrm{T}_2 + 4\,t_3 = 12\,t;$$

Fig. 21.



Willia, more advanced than fig. 20.

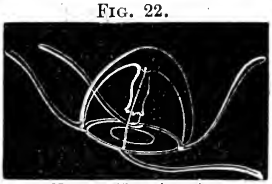
a branch ${}^3c$ is then set off in the opposite direction to ${}^2c$, which soon reaches the circular tube at the point where the third set of tentacles has already been formed. The last formula becoming for this stage:

$$\overbrace{\mathrm{T}_3,\ T_1,\ \mathrm{T}_2},\quad \overbrace{\mathrm{T}_3,\ T_1,\ \mathrm{T}_2},$$
$$\text{or, } \Sigma\, \mathrm{t} = 4\,\mathrm{T}_1 + 4\,\mathrm{T}_2 + 4\,\mathrm{T}_3 = 12\,t.$$

We have thus in *Willia* a very peculiar order of development in the first three sets, modified by the manner of branching of the chymiferous tubes.

In other genera of the Tubularians, as *Turritopsis* McCr., and *Turris* Less,* we find again the same regularity as in *Staurophora* and *Eucope;* the sets of tentacles making their appearance in the same order. In fig. 22, we have a young *Turritopsis nutricula* McCr., having only four tentacles. For a figure of the adult, see McCrady, Proc. Elliot Soc., Plates 4 and 5. Fig. 23 is the same species with sixteen tentacles. The formula of fig. 23 is:

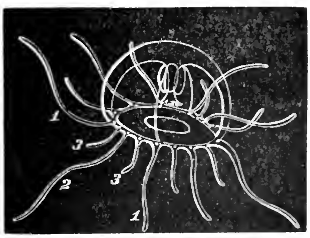
Fig. 22.



Young *Turritopsis.*

$\mathrm{T}_1,\ t_3\ t_2,\ t_2,\ \mathrm{T}_1.$ In the *Nemopsidæ* Ag. and *Bougainvillidæ* Lütk., in which the tentacles are found arranged in clusters, we have an entirely different mode of development. In *Bougainvillia superciliaris* Ag. (for a figure of the adult see Agassiz (L.) in Mem. Am. Acad., Vol. IV. Plate 1) the young Medusa, at the time when it separates from the Hydra, has two tentacles in the prolongation of each chymiferous tube, as in fig. 24; the next sets are

Fig. 23.



Young *Turritopsis nutricula.*

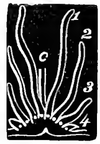
* The *Turris* which occurs at Nahant is probably the *Medusa digitalis* Fab. As the name *Turris digitalis* is pre-occupied for an English species, I would propose the name of *Turris vesicaria* for the species found on our coast.

developed in pairs, one tentacle on each side of those of the first set, as in fig. 25, which is one cluster of tentacles at the time when the fourth set of tentacles is developed. The formula of fig. 24 is:

FIG. 24.

Young *Bougainvillia superciliaris.*

FIG. 25.



$$\overbrace{2\,T_1,}\quad \overbrace{2\,T_1,}$$

or, $\Sigma\, t = 8\,T_1 = 8\,t$.

That of fig. 25 is:

$$\overbrace{T_4\ T_3\ T_2\ T_1\ T_1\ T_2\ T_3\ T_4}$$

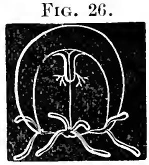
for each chymiferous tube,

$$\text{or,}\ \left\{\begin{array}{ll} 2\,T_1 & 2\,T_1 \\ 2\,T_2 & 2\,T_2 \\ 2\,T_3 & 2\,T_3 \\ 2\,T_4 & 2\,T_4 \end{array}\right\}$$

$$\text{or, } \Sigma\, t = 8\,T_1 + 8\,T_2 + 8\,T_3 + 8\,T_4 = 32\,t.$$

In *Nemopsis Bachei* AG. the tentacles are developed in pairs, on each side of the chymiferous tube, as in *Bougainvillia*; the only difference being that, in *Nemopsis*, the first set of tentacles consists of four, instead of two tentacles, as in the former genus. In fig. 26 we have a young *Nemopsis* with the tentacles of the first set; its formula is: $4\,T_1$, $4\,T_1$. In fig. 27 there are two additional sets formed, and the formula is:

FIG. 26.

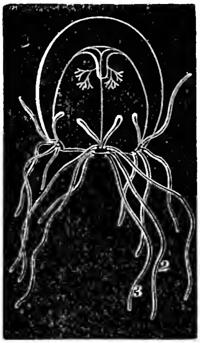


Young *Nemopsis Bachei.*

$$\overbrace{T_3\ T_2\ T_1\ T_1\ T_1\ T_1\ T_2\ T_3},\ \text{for each chymiferous tube;}$$

$$\text{or,}\ \left\{\begin{array}{ll} 4\,T_1 & 4\,T_1 \\ 2\,T_2 & 2\,T_2 \\ 2\,T_3 & 2\,T_3 \end{array}\right\}\ \text{or, } \Sigma\, t = 16\,T_1 + 8\,T_2 + 8\,T_3 = 32\,t;$$

Fig. 27.

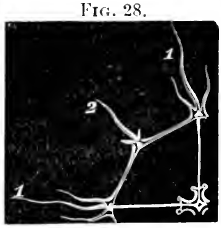


Young *Nemopsis Bachei.*

all the sets except the first having the same number of tentacles. For figures of the adult, see Agassiz (L.), Mem. American Academy, Vol. IV. p. 289; and McCrady, Proc. Elliot Soc., Plate 10, under the name of *Nemopsis Gibbesii.* In *Lizzia*, where there are secondary clusters of tentacles between the chymiferous tubes, the development is not isochronous in the tentacles in the prolongation of the chymiferous tubes and those between them. It is particularly easy to trace the order of succession of the different sets of tentacles in *Lizzia*, as the Medusæ buds are formed on the proboscis, and develop with great rapidity; from these young Medusæ, in their turn, buds are formed which become free Medusæ in three or four days; so that in the course of a week there may be as many as three successive generations swimming in a jar, which, a short time before, contained but a single Medusa. I at first supposed that the young specimens of *Lizzia*, which I found subsequently in my jars, had escaped my attention; but I became satisfied that this was not the case by isolating several specimens of our *Lizzia* with buds on the proboscis, for on examining them, at frequent intervals, I saw the buds upon their proboscis rapidly enlarge, and a few days afterwards I invariably found five or six free *Lizziæ* nearly as large as the one which had been isolated at first. The same experiment was repeated with the Medusæ which had thus been developed; they were isolated with the same result.

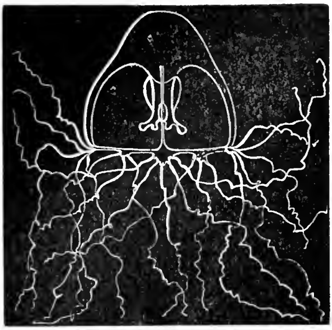
In the young buds of our Lizzia, *Lizzia grata* A. Ag., there are at first four large patches of pigment cells in the prolongation of the chymiferous tubes; the intermediate clusters then make their appearance. The tentacles in the prolongation of the chymiferous tubes are first developed. We have one long tentacle for each tube. Soon afterwards the intermediate tentacles are formed, one tentacle between every two chymiferous tubes; next a pair of tentacles makes its appearance, one on each side of the long tentacle in the prolongation of the tubes; the next set consists of a similar pair for the intermediate tentacle; when the tentacles of the young *Lizzia* assume the appearance of fig. 28. In this state they remain apparently until all the tentacles have become equally developed. This is the appearance of most

Fig. 28.



Young *Lizzia.*

Fig. 29.



Adult *Lizzia grata.*

of the specimens found. It is not till then that we find a second pair of tentacles added on each side of the cluster of tentacles in the prolongation of the chymiferous tubes, as is seen in fig. 29, which represents an adult male *Lizzia grata;* the size of this Medusa is one quarter of an inch in height. The following formulæ would represent these different stages of growth:

$$T_1,\ T_1,\ \text{or},\ \Sigma\, t = 4\ T_1 = 4\ t;$$

$$\text{then},\ T_1,\ t_2,\ T_1,\ \text{or},\ \Sigma\, t = 4\ T_1 + 4\, t_2 = 8\, t;$$

$$\text{next},\ \left.\begin{matrix} T_1 \\ 2\ T_3 \end{matrix}\right\}\ t_2,\ \left.\begin{matrix} T_1 \\ 2\ T_3 \end{matrix}\right\}\ \text{or},\ \Sigma\, t = 4\ T_1 + 4\, t_2 + 8\ T_3 = 16\ t,$$

$$\left.\begin{matrix} T_1 \\ 2\ T_3 \end{matrix}\right\}\quad \left.\begin{matrix} t_2 \\ 2\ t_4 \end{matrix}\right\}\quad \left.\begin{matrix} T_1 \\ 2\ T_3 \end{matrix}\right\}\ \text{or},\ \Sigma\, t = 4\ T_1 + 4\, t_2 + 8\ T_3 + 8\, t_4 = 24\ t,$$

(fig. 28.)

$$\left.\begin{matrix} T_1 \\ 2\ T_3 \\ 2\ T_5 \end{matrix}\right\}\ \left.\begin{matrix} t_2 \\ 2\ t_4 \end{matrix}\right\}\ \left.\begin{matrix} T_1 \\ 2\ T_3 \\ 2\ T_5 \end{matrix}\right\}\ \text{or},\ \Sigma\, t = 4\ T_1 + 4\ t_2 + 8\ T_3 + 8\ t_4 + 8\ T_5 = 32\ t,$$

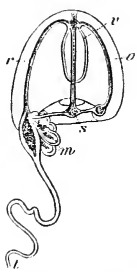
(fig. 29.)

which, to show the arrangement, might be written thus:

$$\overbrace{T_5\ T_3\ T_1\ T_3\ T_5},\qquad \overbrace{t_4\ t_2\ t_4},\qquad \overbrace{T_5\ T_3\ T_1\ T_3\ T_5}.$$

In those Tubularians in which the Medusæ are not symmetrical, as in *Hybocodon* Ag. and in *Corymorpha* Sars (*Euphysa* Forbes?), the order of development is still different from what we have found in any of the preceding species. In a young *Hybocodon prolifer* Ag., fig. 30, the first set consists of one tentacle only. In *Corymorpha pendula* Ag., fig. 31, the first set consists of one tentacle also, the second set of two, which are formed in the prolongation of the two chymiferous tubes on each side of the first tentacle, and the third set consists again of only one tentacle, developed in the prolongation of the chymiferous tube opposite the first tentacle. In fig. 31, the tentacles of the different sets are numbered according to their order of development. The formulæ for the above stages of *Corymorpha* are for the whole cir-

Fig. 30.



Hybocodon prolifer, magnified.

FIG. 31.

? *Corymorpha pendula* Ag., magni'd.

cumference, if O denotes that no tentacle has been developed in the prolongation of the chymiferous tube:

$\Sigma\, t = T_1 = 1\, t$; or $O + O + T_1 + O$, for the first set.

$\Sigma\, t = T_1 + 2\, T_2 = 3\, t$; or $O + T_2 + T_1 + T_2$ for the second set.

$\Sigma\, t = T_1 + 2\, T_2 + T_3 = 4\, t$; or $T_3 + T_2 + T_1 + T_2$ (fig. 31),* for the third set.

Figures 12, 15, 19, 24, 30, have been lent to me by my father, from the wood-cuts of the fourth vol. of his Contributions to the Natural History of the United States. Fig. 31 has been copied from a drawing lent to me by Prof. H. J. Clark. The other figures are copied from drawings made by me during the last two years at Nahant, Beverly, and Naushon. It was not till the appearance of the fourth volume of the Contributions of Prof. Agassiz that it became possible to trace the intermediate stages of growth of the many Hydroids of our coast, the relations of which to our free Medusæ had been traced during the investigations necessary for its publication.

On the subject of the present paper, the above-mentioned work contains only a few facts relating to *Tiaropsis*, and a general inference, derived from isolated facts, that the distinction of species, based upon the number and arrangement of the tentacles, can no longer be considered valid. See, for instance, the modifications which have been proposed in the tabular view of the Hydroids, in Vol. IV. of the Contributions to the Natural History of the United States, with reference to the numerous species of Forbes and of Gegenbaur.

Professor Agassiz mentioned that the Museum at Cambridge had recently received a cast of the great Megatherium of the British Museum. This cast had been sent by Joshua Bates, Esq., of London, to whose munificence the Museum was indebted for this valuable addition to their collections. He had taken this opportunity of comparing the bones of the South American species with some fragments of Megatherium bones which he found several years ago near Savannah,

* Owing to the great difficulty of distinguishing the free Medusæ of *Corymorpha* (which has only been discovered this spring) and that of *Hybocodon*, I have marked the Medusa of the former as doubtful.

Georgia, and with additional pieces sent to him by Dr. Habersham. As the North American Megatherium had, upon theoretical grounds, been described from a few fragments as a distinct species from the South American one, by Dr. Leidy, it was an interesting question to ascertain how far this theoretical distinction was well founded. Fortunately, the fragments, which had been found by Professor Agassiz and Dr. Habersham, were exceedingly characteristic, and included portions of bones which enabled Professor Agassiz to satisfy himself of the specific difference of the Patagonian and of the North American Megatherium. He then exhibited to the Society a portion of the ulna and radius with the perfect articulating surface of the elbow. The ulna of the two species is about the same size, the North American being somewhat shorter and blunter, while the olecranon is very prominent in the South American species. The articulating surfaces of the radius were very different, showing a much greater power of rotation in the northern species, while the great development of the articulating surface must have restricted the rotation in the southern species to much narrower bounds; and other minor differences between the heel-joints and the spinous processes, which all tend to prove that the North American Megatherium must have been more flexible than the southern species. The question then arises how far it is possible for these two animals to have been generically distinct, as the differences which have thus far been pointed out are structural differences. Professor Agassiz was inclined to believe that the differences which he had pointed out were not simply specific, but that they were generic. This view he supported by making a short revision of the Edentata, and showing that the three groups into which Owen had subdivided them were of such a character that he considered them as suborders. The Megatheroids would be divided into two families, as the presence of a trunk indicated by the structure of the anterior portion of the skull in Megatherium would warrant its separation, as a separate family, from Megalonyx, in which we have a short snout. This subdivision into families would simply be applying to the Edentata the same principles of classification which are adopted in the Pachyderms.

In reply to a question of Dr. C. Pickering, Prof. Agassiz stated that he had no satisfactory conclusive evidence in regard to the exact geological age of the deposits in which the North American Megatherium is found.

Dr. Pickering said that he had seen the deposits of the Rio Negro, where the South American Megatherium was discovered, and was inclined to consider them as belonging to the age immediately preceding our own.

Mr. Scudder presented the following paper:—

On the Genus Colias in North America. By Samuel H. Scudder.

The determination of the different species of the genus *Colias*, their limits and relations to one another, is one of the most difficult undertakings in the study of the diurnal Lepidoptera, and is rendered by no means less so by the confusion into which they have been thrown by those who have written upon them. Ménétriés, it seems to me, is almost the only one who has brought to their investigation any considerable degree of acumen or of perseverance. Among the North American species there is as great a degree of confusion as there is anywhere; so that it is necessary for one attempting a fair and impartial investigation into the species on this continent, to entirely separate himself, at the start, from a knowledge of opinions previously expressed in regard to them, if he would not become hopelessly entangled in an intricate web of misconceptions and disagreements. I have had the opportunity of examining a very large number of specimens from the Eastern States and from the Pacific Coast, a considerable number from Labrador and from the central boreal regions, and a few from the States bordering the Mississippi River. The collections which I have used have been those of the Museum of Comparative Zoölogy, Cambridge; the very beautiful series of Mr. W. H. Edwards, at Newburgh, N. Y.; the collection of butterflies of the Lyceum of Natural History, Williams College, Mass., and my own specimens, which are mainly from New England.

In treating of the genus *Colias* in North America, we should first of all separate from them *C. Cæsonia* Stoll and *C. Wosnesenski* Mén.; of which latter, according to Edwards, in Morris's Synopsis, C. *Eurydice* Boisd. is a synonyme,—these must be placed in the genus *Zerene* Hübner.

Of the number of species found south of the northern boundary of the United States, I cannot form any settled opinion, nor can I of their range; for, though I have seen a very large number of specimens, these have been limited mostly to the extreme eastern and western borders of our country; yet I have very strong doubts whether there are anywhere more than two species, *C. Philodice* Godt. and *C. Eurytheme* Boisd.,—the former an Eastern species, but found so far west as Missouri; the latter a Western, but found so far east as the Mississippi, and perhaps even to the Atlantic border, south of New York. The former is the only sulphur-yellow *Colias* I am acquainted with in the United States, the latter the only orange-tinted species I know of within its borders. To *C. Philodice* belong, I think, specimens in the Museum of Comparative Zoölogy, from Osage River, Missouri, which are very large,—males and females alike measuring two and one-half inches in expanse of wings, and having the under surface of secondaries pure yellow, without any dusky scales. Here, also, belongs a pair of specimens, taken *in coitû*, in Illinois, in Mr. Edwards's collection,—the male of which has the wings yellow, but plainly tinged with orange on the disc; the only specimen of *C. Philodice* which I have seen with any orange tint upon it.

To this species, also, must be referred all the species indicated by Fitch in the 13th vol. of the Transactions New York State Agricultural Society, as *Chrysotheme* var. A, *Phicomone*, *Nastes* and *Santes*,—the three former of which are not the species so named by European authors, and the last of which is named only from a dwarfed specimen of *C. Philodice*, equally small individuals of which I have seen in Mr. Edwards's collection. It should also be added here that Dr. Fitch leads us into an error when he states that they may all doubtless be considered as but "varieties of two species, the *Philodice* and *Phicomone* of Godart,—*the latter having a row of yellow spots in the black border of the upper wings in both sexes*, whilst the former has these spots in the females only;" for we have no species here having a row of yellow spots in the marginal border of the males, and so at all referable to *Phicomone*.

It would seem as if the genus *Colias* might properly be divided into three sections: —

1°. Those having a glandular space at the base of the secondaries in the males.

2°. Those wanting this space, and having the two sexes of the same color.

3°. Those wanting this space, with the sexes of different colors.

Of the first section, none have been found in North America. To the third seem to belong all and only the boreal species.

There are two kinds of females of *C. Philodice*. One, by far the most common, is of the same yellow color as the male, or very nearly the same; the other is whitish, about the tint of *C. Hyale*, or even much paler. I have seen some considerable variation in the depth of tint in both, but never any specimens through which a gradation could be shown from one to the other,—they are either of one tint or the other,—nor have I seen this albinism ever exhibited in the males. This does not leave us in doubt that *C. Philodice* should be placed in the second section, for the white females are of great rarity.

I have examined a large number of specimens from California and Washington Territory, obtained by Mr. Agassiz, which answer exactly to the description given by Boisduval of *C. Eurytheme* and *C. Amphidusa*, and I consider them to be the same species, for which the name of *Eurytheme* must be retained; the only difference between the two which acquires any degree of constancy is the depth and breadth of the orange tint upon the upper surface, which, in the specimens that correspond to his *Amphidusa*, covers the whole wing not occupied by the black border; while, in those corresponding to his *Eurytheme*, it covers only a central portion, and is not so deep, being mixed more with yellow; but this depth and extent of the tint appears also to be a variable character, and not to separate into two well-marked groups these Western individuals. I have seen specimens from Minnesota, Lake Superior and Texas, which seem to correspond entirely to those of the Pacific Coast. Mr. Edwards first brought to my attention the fact that the upper surface of this species has a purplish lustre when seen by oblique light, especially in those from California and Texas. This is undoubtedly the species referred to by various authors in stating that *C. Edusa* and *C. Chrysotheme* were found in California, and I suspect its prevalence even to the Atlantic border, south of New York, because it has also been asserted by authors that the two species just mentioned had been found there. I have not seen any specimens from the Middle States which could have been mistaken for them, and so cannot speak with any certainty.

Boisduval mentions, in his description of *C. Amphidusa*, that the only female he had seen was pale. There are no albinic specimens among the females I have seen; but if they occur, it only agrees, in this respect, with other allied species. Morris, in his Synopsis, gives Boisduval's authority for the localization of *C. Hyale* in California. I do not know where Boisduval asserts this, unless it be in the 3d Series of the Annales de la Société Entomologique de France, which I have not seen, but if he does, it may have been a mistaken reference of this albinic female of *C. Eurytheme* to that species.

There are three species of *Colias* in boreal America, — *C. labradorensis*, *C. interior* and *C. occidentalis*,— described below. The first inhabits Labrador, the second the interior of the continent, and the third the western portion, including the Rocky Mountain region. They are all closely allied to one another and to *C. Pelidne*, Boisd. and Lec. They do not, any one of them, agree with the figures and descriptions given of *C. Pelidne*, — under which name, I suspect, more than one species is confounded. Boisduval, in his first description of *C. Pelidne*, in Boisduval and Leconte's Histoire générale des Lépidoptères de l'Amerique Septentrionale, states it to be found in Greenland, Iceland and Labrador, and I presume his figure to have been taken from, and his species referable to, the species found in the former localities. The male of *C. Pelidne*, as figured by Boisduval in his Icones historique des Lépidoptères, is much like the male of *C. interior;* while the figures given by Herrich Schæffer (which I cannot think, with Ménétriés, were copied by Godart) closely resemble *C. labradorensis*, if they are not of the same species, though the species described as *Pelidne* by Ménétriés, on page 84 of his St. Petersburg Catalogue, does not seem to be the same as *C. labradorensis*. "Lederer," says Ménétriés, "pretends that he knows *Pelidne* only from Labrador." I think it must be that the true *C. Pelidne* is not found in Labrador, and that my *C. labradorensis*, which cannot be referred to it, is the species seen by Lederer, and hitherto undescribed. Other species, known in boreal Europe, have also been stated to have been found in boreal America, but I suspect that, in all these cases, a close resemblance has been mistaken for an identity. Of the two Arctic species, I know nothing, but none of the species I here describe are the *C. Boothii* or the *C. Chione* of Curtis, described in the Appendix to Ross's Second Voyage.

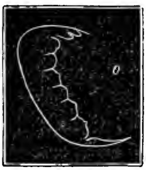
There seem to be three distinct faunæ in boreal America, in each of which the genus Colias is represented by a distinct species; so far as is simply indicated by an examination of the species of diurnal Lepidoptera which I have seen from there, the easternmost is confined to a narrow limit, comprising only the eastern portion of Labrador; the central appears to include in general all the country watered by streams flowing into Hudson's Bay, whether upon its eastern, western or southern coast; and the westernmost includes the Rocky Mountain region, and the country west of it. These faunæ are very closely related to one another, being connected most intimately by true representative species; they are connected together more intimately than any of them are to the faunæ lying immediately south,— in the north temperate region the relationship between these two sets of faunæ being shown rather by what may be termed *equivalent* species, as, for instance, *C. Philodice*, in comparison with *C. labradorensis* or *C. interior;* for there may be said to be three sorts of species, which may be designated thus: —

1°. *Representative species*, or those forms occupying different geographical areas, which exhibit an intimate homology in their specific peculiarities, such as the three species of Colias here described in comparison with one another.

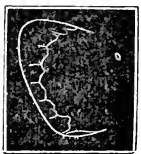
2°. *Equivalent species*, or those forms occupying different geographical areas, which do not exhibit such an intimate homology in their specific peculiarities, but simply represent the genus in the faunæ in which they are located, without any such peculiar reference to the species of the same genus in other faunæ, and so may also be well termed *species of replacement*. It will thus be seen that any given species may be a representative species when compared with one, and an equivalent species when compared with another specific form.

3°. *Complemental species*, or those generically allied forms which occupy the same geographical area, where, if I may so express it, the *specific material* belonging to any one zoölogical fauna has been given expression through more than one specific form. Examples have been given sufficient to illustrate my meaning in regard to the first two classes; of the third, good examples will be found in *Pieris Rapæ* and *Napæ* of Europe, which, in reference to one another, are complemental species, while both together are representatives of our *Pieris oleracea*.

I place here three cuts exhibiting the marginal bands of the three boreal American species of Colias, after the example of Ménétriés in his catalogue, with descriptions appended.



C. occidentalis.



C. interior.

C. labradorensis.

COLIAS LABRADORENSIS (nov. sp.)

♂. Above, *primaries* lemon-yellow with a slight greenish tinge, brighter than in *C. Hyale*, much as in *C. Palæno;* marginal band broad, black, dusted with yellowish scales; the inner border irregularly crenulated, parallel with the outer border, except near the costal border, where with a full curve it is turned inward a little; there is also a slight turning in of the border just below the sub-median nervure; the fringe is of moderate width; there are crowded black scales occupying a small space at the lower portion of the base of the wing; —*secondaries* much the same color as the primaries, but having a very slightly more greenish tinge; the outer black band extends from midway between the termination of the costal and upper branch of the sub-costal nervures to midway between the termination of the sub-median and lower branch of the median nervures, sometimes reaching the former; the band is of moderate breadth, with the inner border quite regularly curved, sometimes slightly scalloped; the base has many black scales, giving a grimy appearance, not extending over a wide space, but chiefly attaching to the median nervure.

Below, *primaries* of the same yellow as the superior surface, but somewhat griseous, through the presence of scattered black scales over the apical half, abundant along the costal edge; the inner border is free of them, and of a paler yellow; the costa is of the same pink as the fringe, and the spot at the extremity of the cell is transverse, black, with a pink or yellow conspicuous centre;—*secondaries*, greenish-yellow, griseous, with black scales, which are less numerous, in a faint, broad band along the outer margin, which is thus of a slightly lighter tint; the fringe of pink extends around the costal border as a narrow edging; there is generally a slight cluster of reddish-brown scales just beneath the extremity of the costal nervule; the spot at the tip of the cell is small, circular, of pink scales, deepening in tint from the centre,—where there are mixed a few white scales,—so that the edge is sometimes brownish; it is almost invariably single, but occasionally with a secondary one towards the outer angle of the wing; there is a small spot of pink scales at the base of the wings.

♀. Above, *primaries* very pale dirty white, with a slight greenish-yellow tinge; costal border somewhat griseous, with dark scales; the apex is occupied by a dark brownish spot, having the inner border ill-defined, sometimes so large as to extend half way to the termination of the cell, and reaching the internal angle as a narrow band; when it is large there are several streaks of the color of the disc towards its inner border, placed between the nervures, generally broadest toward the base, and acuminate toward the inner border; the spot at the extremity of the cell is faint or absent, a little transverse, brownish, with a pale centre; the costal edge is pink, as is also the rather narrow fringe;—*secondaries*, of the color of the disc of primaries, but with more of a greenish tinge, with a very faint broad border wanting it; a few blackish scales cluster around the tips of the nervures at the outer angle, where the pink fringe is interrupted paler by bands.

Below, *primaries* as in the male, except in having the yellow replaced by a very pale greenish-white, save at the tip, where there is a spot of yellow;—*secondaries* as in the male; head, antennæ, and palpi above, pink; palpi below, yellow; lower side of club of antennæ, yellowish; legs pink; expanse of wings, two inches. 8 ♂, 5 ♀. Caribou Island, Straits of Belle Isle, Labrador. (A. S. Packard, Jr.)

Colias interior (nov. sp.)

♂. Above, *primaries* lemon-yellow, as in *C. labradorensis*, but lacking the greenish tinge, and so of a brighter tint, much as in the male of *C. philodice;* costal edge dark pink; marginal band black, narrow, except at tip; the inner border of band with a deep curve, extending along costal border to the tip of the costal nervure, not extending far inward along the inner border, the deepest portion of the curve and the narrowest of the band being where the third branch of the median nervure strikes it, and so placed much farther down than in *C. labradorensis* or *C. Philodice* or *C. occidentalis;* the spot at the extremity of the cell is generally wanting, but when present is an indistinct transverse spot of grayish scales, with a yellowish centre; there are a very few grayish scales clustered at the base of the wings; the fringe is pink; — *secondaries* of the color of the primaries, with the marginal band narrow, not crenulated interiorly, extending from the second (or between the first and second) branch of the median to just beyond the first branch of the subcostal nervure; discal spot small, circular, pale orange, with a faint dusky border; fringe pink, pale towards the outer angle.

Beneath, of a more sulphur-yellow, with scattered grayish scales; the costal border of both wings narrowly edged with pink; the discal spot of primaries as above, but distinct, discal spot of secondaries not small, circular, the centre composed of silvery and pale pink scales mingled, with the border composed of reddish-brown scales; fringe pink.

♀. Above, white, with a very pale yellowish tinge; costal border with a few griseous scales joining a dusky spot at tip, which has the inner border illy defined, but extends with a curve around the outer border rather more than half way down to the inner angle, as in some specimens of *C. labradorensis;* the discal spot is as in the male, and indistinct; the secondaries are immaculate, save the faint discal spot as in the male.

Beneath. The only specimen I have is somewhat rubbed, but appears not to differ from the male, except in being pale instead of yellow.

Head, etc., as in *C. labradorensis*, except the under surface of the club of the antennæ, which is yellowish-brown.

Expanse of wings, ♂ 2.1 in.; ♀ 2 in. 5 ♂, 1 ♀. Northern shore of Lake Superior (Prof. Agassiz); mouth of the Saskatchewan River, British America. (S. H. Scudder.)

Colias occidentalis (nov. sp.)

♂. Above, *primaries* color of *C. philodice;* the marginal band quite broad; the inner border curved much as in *C. labradorensis*, commencing at a point a little inside the termination of the costal nervure, and extending inwards along the internal border rather more than in *C. labradorensis*, parallel to the border from the upper median nervule to the sub-median nervure; a few distant grayish scales are scattered along the costal border, scarcely affecting the general tint; they are clustered profusely at the base, but extend over only a narrow space; the discal spot is small, oval, transverse, sometimes quite faint; fringe pink; — *secondaries* same color as primaries, with grayish scales scattered over nearly the whole wing, more profuse at the base; the marginal border is very nearly as broad as that of the primaries; the inner border only slightly curved, extending from the tip of the costal nervure to the second median nervule, with a spot between the first and second median nervules; discal spot as in the males of *C. interior;* fringe pink, paler toward outer angle.

Beneath, *primaries* same color as above, with the costal border somewhat griseous with grayish scales, and the apex of a slightly deeper sulphur-yellow;— *secondaries* sulphur-yellow, with black or grayish scales scattered rather profusely over the whole wing, least abundant toward the outer border; there is a small spot of pink scales at the base, and a small, faint spot of ferruginous scales just below the tip of the costal nervure; there are three faint dots of brownish scales, scarcely perceptible, on each, near the middle of the space between the sub-median and the first branch of the median, the first and second and second and third branches of the median nervures; the discal spot is much as in *C. interior.*

♀. Above, *primaries* white, with a very pale greenish tinge; costal border broadly margined with closely-clustered grayish scales; a very broad, dusky margin to the external border, which has along its middle line a series of large, ill-defined, whitish spots, as in the females of *C. Eurytheme* Boisd.; the base has a broad spot of much scattered grayish scales, more closely associated toward the internal border; the discal spot is large, rounded, of grayish scales, with a small whitish centre;— *secondaries* like the primaries, with a slightly deeper greenish tint; the outer marginal band broad, extending with equal breadth nearly to the internal border, but nearly obliterated by the row of large white spots occupying so much of its space; grayish scales scattered over the whole disc, closely clustered between the median and sub-median nervures, especially toward the base; the discal spot is large, circular, pale orange; the fringe of both wings is pale pink.

Beneath, *primaries* of the same general tint as the upper surface, with scattered gray scales along the costal border, and across the wing along a line corresponding with the inner border of the band on the upper surface, clustered between the nervures into more or less distinct and larger or smaller spots; the apical portion is pale yellowish;— *secondaries* very pale sulphur-yellow, with indistinct grayish scales, rather distant, but more abundant toward the basal half of the disc; discal spot as in the female of *C. interior;* there is a faint spot by the tip of the costal nervure, as in the male, and a row of indistinct brownish dots parallel to, and distant from, the hind border, between the nervules, as in the males, but rather larger, more distinct, and numerous.

The primaries of the females are noticeably more pointed, and their outer border straighter than those of the males.

Antennæ dark brown above, reddish brown below; legs and collar pale pink; expanse of wings, ♂ 2.1 in.; ♀ 2.4 in. 2 ♂, 3 ♀. Gulf of Georgia (A. Agassiz); Fort Simpson, British America. (W. H. Edwards.)

The President announced the completion of the subscription, in aid of the Society, to the required amount of $20,000, and stated that the $20,000 promised on this condition, by a gentleman in this vicinity, had been placed in the hands of the Treasurer.

Prof. Wm. B. Rogers congratulated the Society upon this large accession to its means of usefulness, and offered the following resolutions : —

Resolved, That the donation of $20,000, this day presented to the Society, through the President, by Dr. Wm. J. Walker, be hereby accepted, to be appropriated in such manner as may conform to the wishes and suggestions of the donor.

Resolved, That the Society hereby tender to Dr. Walker their most grateful acknowledgments for this renewed and munificent proof of his interest in their prosperity, and for the occasion and the incentive which it has afforded to other friends of the Society to contribute an equal aggregate amount.

Resolved, That, in view of this and the previous benefactions by which Dr. Walker has marked his appreciation of our scientific labors and aspirations, we feel that to his liberality, chiefly, we are indebted for the enlarged opportunities of usefulness now so brightly opening before us, and that, in offering him the homage of our grateful hearts, we have no need to assure him of the enduring honor which will associate his name with the future successes and the whole history of the Society.

The resolutions were seconded by Rev. Mr. Waterston, and adopted unanimously.

Prof. Rogers proposed in addition the following resolutions, which were passed : —

Resolved, That the Society is deeply grateful to the kind patrons who, amid the urgent public claims on their liberality, have contributed towards the erection of our new building an aggregate sum of $20,000, and have thereby enabled the Society to secure the further munificent donation of equal amount, which was promised on condition of our obtaining this subscription.

Resolved, further, That, as a permanent memorial of this generous and timely liberality, the names of the donors be placed on the records of the Society, in connection with the proceedings of the present meeting.

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$1,000.

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SAMUEL L. ABBOT, M.D.

J. P. Gardner and Dr. E. T. Wilson, of this city, and Geo. G. Kennedy, of Roxbury, were elected Resident Members.

June 18, 1862.

The President in the chair.

Mr. B. G. Wilder stated that he had recently examined a live Chimpanzee (Troglodytes niger) just imported from the west coast of Senegambia.

It is a female, and quite young, as shown by her possessing a complete set of milk teeth, and by her height, which is just two feet. She was brought in by the Fullah negroes to a small town named Buffa, near the mouth of the Rio Pongo, a short distance south of the Rio Nunez; this is in ten degrees north latitude; and the animal is found in greater or less abundance as many degrees south, while the Gorilla, and the two other species of Chimpanzee (T. calvus and the Kooloo-Kamba of Du Chaillu) appear to be much more limited in their geographical range. This individual is very gentle and affectionate, but a snappish impatience on being denied any gratification already indicates a disposition which, as age advances, is likely to become decidedly ill-tempered. She is now on exhibition in this city, by Captain John Sears, for whom she was purchased in Africa, by

Captain Skinner. The latter says that at the same town a pair of nearly full-grown ones were domesticated, one of whom, on his approach, gravely advanced and offered his hand. He also brought two large constrictor snakes, which are either Boas or Pythons; the latter, if they have teeth in the intermaxillary bone, a question which I could not safely decide.

I have nothing new to offer upon the general habits and manners of the Chimpanzee, concerning which, and those of the Gorilla, see Martin's Man and Monkeys; Dr. Savage and Prof. Wyman on the Natural History and Anatomy of Gorilla, Boston Journal of Natural History, Vol. v. No. 4, 1847; Prof. Owen on the Gorilla, in the Classification and Geographical Distribution of Mammalia, and Du Chaillu's Equatorial Africa. But I will say a few words on some points in its anatomy connected with its habits.

First, as to the power of straightening the limbs, which differs in the arms and legs; the former may be made nearly or quite as straight as the human, as is natural, since, in their natural mode of progression, the body is supported by the arms; but the flexors predominate over the extensors. The legs cannot be straightened to the same extent, for the animal seldom hangs by them, and in progression upon the earth the legs are always semi-flexed; the weakness of the extensor muscles of the trunk and legs is another evidence of the ape's inability to assume and maintain the erect position. The knee joint admits of considerable rotation, in adaptation to the prehensile function of the foot, the hand-like appearance of which is due not only to the separation of the great toe from the others as an opposable thumb, but also to the elongation of the third or middle digit as in the human hand. But I wish, in particular, to correct an erroneous inference given in my paper on the muscles of the Chimpanzee (Contributions to the Comparative Myology of the Chimpanzee; Boston Journal of Natural History, Vol. VII., April 17, 1861). The specimen which I dissected was of the same size as this, but had been preserved in alcohol for several years. I observed that the hand and fingers could not be straightened together; but if the hand was extended in the same line with the fore-arm, the fingers curled up tightly about mine; so that, in addition to the great strength of the flexor muscles of the fingers, here was also a *mechanical* assistance in climbing, resulting from the shortness of the tendons; this seemed a very nice thing, and was borne out by the fact that the digits of the anthropoids are usually flexed, and that the *knuckles* of the anterior limb are applied to the earth, instead of the palmar surface. But a moment's examination of this live individual showed that the inference had not the slightest foundation in nature; for her hands and fingers may be bent back together quite as far as those of man. The error in the case of the dead specimen undoubtedly arose from the unnatural contraction of the flexor muscles, which, as we have seen, are very thick and fleshy, by the spirit in which it had been preserved. My inference was *natural*, but the facts were *unnatural.*

And it will be seen that while this structure, as it existed unnaturally in the dead specimen, would be highly useful in climbing, it would almost entirely prevent the use of the hand for any other purpose.

This correction will be added to my paper before it is bound up.

YOUNG CHIMPANZEE—TROGLODYTES NIGER.

MEASUREMENTS (WITH TAPE).

	Feet.	Inches.	Tenths.
Level of top of head to nape of neck - - - - - - - -		4	
" " ischiatic tuberosity to nape of neck - - - - - -		11	
" " " " " bottom of heel - - - - - -		9	
Height of whole body (standing erect as possible) - - - - -	2		
Greatest spread of upper extremities - - - - - - - - -	2	10	5
Length of arm (from elbow to distal end of clavicle) - - -		5	
" " forearm " " wrist - - - - - - - - -		5	
" " hand to tip of middle finger - - - - - - - - -		4	5
" " each upper extremity - - - - - - - - - -	1	2	5
Breadth of shoulders between tips of clavicles - - - - - -		5	5
Circumference of head (base of superciliary ridges and occiput)		13	
From nape of neck to the crest of " " - - - - -		7	5
" tip of chin " " " " " - - - - -		4	
Width of face across orbits - - - - - - - - - - -		3	5
" " inter-orbital space - - - - - - - - - - -			6
" " mouth - - - - - - - - - - - - -		3	
" " ear - - - - - - - - - - - - -		1	7
Length of ear - - - - - - - - - - - - -		2	5
Circumference of trunk at arm-pits - - - - - - - - -	1	5	
Lateral diameter " " " " - - - - - - - - -		6	5
Antero-posterior " " " " - - - - - - - - -		5	2
" " " " " fullest part - - - - - - -		6	
Lateral diameter " " " " " - - - - - - -		7	
Circumference " " " " " - - - - - - - - -	1	6	
" " " " hips - - - - - - - - -	1	1	
Lateral diameter " " " " - - - - - - - - - -		5	
Length of first metacarpal (of thumb) - - - - - - -		1	2
" " " digit (thumb) - - - - - - - - -		1	3
" " third " (middle finger) - - - - - - - -		2	5
Width " " - - - - - - - - - - - - -		1	7
Sole of foot from heel to tip of third digit - - - - - - -		5	
" " width, including first digit standing at right angle with it		3	7
Length of first metatarsal (of great toe) - - - - - - -		1	
" " " digit - - - - - - - - - - - -		1	5
" " leg, from trochanter to tip of middle toe - - - - -	1	2	
" " thigh - - - - - - - - - - - - -		5	5
" " leg (tibia) - - - - - - - - - - - -		5	

Mr. S. H. Scudder presented a paper entitled "Materials for a Monograph of the Orthoptera of North America, with a list of the known New England Species."

The following papers were presented: —

Catalogue of American species of Tenthredo, as arranged by Hartig. By Edward Norton.

In a paper on the "Genus Allantus," in the Journal of the Boston Society of Natural History, December, 1860, I adopted the divisions indicated by Leach and followed by Stevens in his British Entomology, viz.:

Allantus, third joint of antennæ longer than fourth; clypeus generally notched, &c.

Tenthredo, third joint of antennæ scarcely longer than fourth; clypeus generally rounded, &c.

This division is not so satisfactory as that advocated more or less by Klug, St. Fargeau, Curtis, Dahlbom, and more fully presented by Dr. Hartig, which is here briefly sketched, and all the described species known to me assigned to their respective places, together with several species, supposed to be new, in the three last-named sub-genera. I have given the references in full to the species not noticed in the above-mentioned article.

Genus Tenthredo, Klug.

Antennæ nine or ten jointed; wings with two radial and four cubital cells, the two recurrent nervures entering the second and third cubital cells.

Body short, oval, small.	Antennæ nine jointed,		1. Selandria.
	" ten or eleven jointed,		2. Athalia.
Body lengthened, large, antennæ nine jointed.	Coxæ lengthened,		4. Macrophya.
		Antennæ short, toward the end thickened,	3. Allantus.
		Antennæ lengthened, bristle-shaped,	5. Tenthredo.

Selandria, Leach. See Proceedings of the Boston Society of Natural History, Vol. VIII., 219.

Athalia, Leach. Antennæ ten or eleven jointed, somewhat thickened toward end, third joint long; lanceolate cell with oblique cross line.

Allantus, Jurine. Antennæ hardly longer than thorax, mostly thickened toward the end; body cylindrical; coxæ reaching as far as the edge of the third * abdominal segment; lanceolate cell, without exception, with straight cross line.

MACROPHYA, Dahlbom. Coxæ large, reaching the edge of the fourth * segment.

Section 1. *Macrophya.* Antennæ hardly longer than base of thorax, somewhat thickened in the middle.

Tribe 1. Lanceolate cell with oblique cross line; under-wings two middle cells.

Tribe 2. Lanceolate cell with straight cross line; under-wings two middle cells.

Tribe 3. Lanceolate cell closed in middle; under-wings two middle cells.

Section 2. *Pachyprotasis.* Antennæ longer than base of thorax, bristle-shaped.

Tribe 1. Lanceolate cell with straight cross line; under-wings two middle cells.

Tribe 2. Lanceolate cell closed in middle; under-wings two middle cells.

TENTHREDO, Klug. Coxæ as usual; antennæ bristle-shaped, longer than basal segments of abdomen; body generally flattened, sometimes lengthened, rounded; tibiæ, especially the hinder pair, with obtuse skin-covered spurs.

Section 1. *Taxonus*, Mühl.

Tribe 1. Lanceolate cell with oblique cross line; under-wings no middle cells.

Tribe 2. Lanceolate cell with oblique cross line; under-wings two middle cells.

Section 2. *Strongylogaster*, Dahlb.

Tribe 1. Lanceolate cell with oblique cross line; under-wings two middle cells.

Tribe 2. Lanceolate cell without cross line; under-wings two middle cells.

Section 3. *Pœcilostoma*, Dahlb. Lanceolate cell with oblique cross line; under-wings one middle cell.

Section 4. *Perineura*, Hartig. Lanceolate cell closed in middle; under-wings no middle cells.

Section 5. *Tenthredo.* Lanceolate cell with straight cross line; under-wings two middle cells.

Section 6. *Synairema*, Hartig. Lanceolate cell closed in middle; under-wings two middle cells.

ATHALIA, Leach.

Synonymy, Tenthredo (Allantus). Family I. Klug.

Proxima, Klug, Berlin Mag. VII. 1813, p. 130.

* Many writers call these the second and third segments, because the first is often concealed by the basal plates of metathorax. See Westwood's Mod. Classifi. Vol. II. 92.

Allantus, Jurine.

Synonymy, Tenthredo.

Basilaris, Say. Coronatus, H. Cat.
Dubius, Harris's Cat.
Excavatus, Norton. Proc. Ent. Soc. Phil. I. 143.

Macrophya, Dahlbom.

Synonymy, Tenth. (Allantus). Family III.–IV. Klug.

Section 1. *Macrophya.*

Tribe 2.

Epinotus, Say. Sambuci. H. Cat.
Intermedius, Norton.
Cestus, Say.
Bifasciatus, Say.
Medius, Harris's Cat.
Formosa, Klug. Berlin Mag. VIII. 1814, p. 115. Geo. Bicinctus, Norton.
Pulchella, Klug. Berlin Mag. VIII. 1814, p. 121. Geo. Flavolineatus, Norton.
Trossulus, Say.
Dejectus, Norton.
[2] Pluricinctus (n. sp.)

Section 1. Tribe 3.

Goniphorus, Say.
Varius, Norton.
Trisyllabus, Say.
Niger, Norton.
Albomaculatus, Norton.
Incertus, Norton.
Flavicoxæ, Norton.
[1] Pannosus, Say.

[1] Not seen, but supposed to belong in this section.

[2] *Macrophya pluricinctus* (n. sp.) ♀ ♂. (Length 0.28, Ex. 0.60 in.)
♀. Black, with white bands; antennæ stout as in Allantus, third joint long; face black; clypeus hardly emarginate; palpi partly white; wing scale, edge of collar, spot on the front of scutellun, edge of basal membrane, and a band at tip of each segment of abdomen, white; tips of all the femora, the four anterior tibiæ and tarsi beneath, tips of coxæ and the upper side of posterior legs, white; tarsi partly black; the middle of four posterior tibiæ encircled with white, extreme tips black; wings hyaline, stigma white at base.

♂. The male differs only in having the bands interrupted on the middle of tergum, and the posterior femora with a white line above and beneath.

Two specimens. San Mat. California. Cambridge Museum.

The bodies are short and stout as in Selandria.

Tenthredo.

Synonymy, Tenth. (Allant.) Family VI. Klug.

Section 1. *Taxonus.*

Tribe 1.

[3] Nigrisoma (n. sp.)
[4] Unicinctus (n. sp.)

[5] Tribe 2.

[6] Dubitatus (n. sp.)

[3] *Taxonus nigrisoma* (n. sp.) ♀. (Length 0.30, Ex. 0.60 in.)
♀. Color, blue-black, legs yellow-red; antennæ slender, basal joint enlarged, third longer than fourth, apical joint as long as preceding; clypeus emarginate angulate; labrum and middle of mandibles pale-reddish; legs red or honey-yellow; base of coxæ and tarsi black; wings hyaline; stigma and costa black, costal space hardly visible.
Two specimens. Massachusetts. Harris's Coll. and F. G. Sanborn.

[4] *Taxonus unicinctus* (n. sp.) ♀ ♂. (Length 0.30, Ex. 0.60 in.)
♀. Black, a rufous band on fourth and fifth segments of abdomen; third joint of antennæ longer than fourth, flagellum rufous beneath; a blunt spine between antennæ; labrum, mandibles, and palpi pale luteous; tegulæ, coxæ, and base of femora white; a spot at the tip of second and third segment of abdomen above, the fourth and fifth, and also all of the third beneath, and the legs, honey-yellow; base of coxæ, the anterior coxæ above, and the posterior tarsi, black; wings hyaline; marginal cross nervure straight, and received near third sub-marginal nervure; stigma and costa black.
♂. Flagellum beneath rufous toward tip; spine between antennæ not prominent; clypeus deeply emarginate, enclosing labrum, both white; the four basal segments of abdomen honey-yellow; the four anterior tarsi paler than those of female; tips of posterior tarsi black; dividing marginal nervure curved; stigma at base and costa pale.
Hab. Farmington, Conn.
Four specimens. One of the males has red shoulders. I cannot be positive that this is the male of *T. unicinctus.*

[5] This tribe has been added to that proposed by Hartig, because the species described below seemed to render it necessary.

[6] *Taxonus dubitatus* (n. sp.) ♀ ♂. (Length 0.24–26 in., Ex. 0.48–52 in.)
♀. Honey-yellow, head and metathorax black; antennæ slender, black, third and fourth joints of equal length; a basin beneath base of each of antennæ, and above these, side by side, three others, springing from each of ocelli; clypeus slightly emarginate, labrum retracted, both white; mandibles and palpi yellowish; scutel, metathorax, and basal plates blackish; posterior tibiæ, except at base and tips of all the tarsi above, blackish; wings hyaline, edges of stigma and the costa black.
♂. The male has the apex of flagellum pale beneath; upper half of pleura, apical half of abdomen, and the sides of the basal half above, black; coxæ and trochanters almost white; posterior tibiæ like the others, with only the apical joints of tarsi and the nails black.
Eleven specimens. Conn., Mass., F. G. Sanborn. Hoboken, N. J., C. F. Jung.
The thorax is narrow and body long and slender like *Taxonus rufipes* of Europe.

STRONGYLOGASTER, Dahlb.

Section 1. Tribe 1.

Terminalis, Say. All. melisoma, H. Cat.
Mellosus, Norton.
[1] Apicalis, Say.
[7] Abdominalis, Norton.
[7] Epicera, Say.
[8] Rufocinctus, Norton.
[7] Pinguis, Norton.
Pallipes, Say.
[9] Multicolor (n. sp.)

Tribe 2.

Tacitus, Say.
[12] Rufescens, Norton.
[10] Unicus (n. sp.)
Multicinctus, Norton, Proc. Ent. Soc. Phil. I. 143.

Section 5. *Tenthredo.*

[11] Tardus, Say.
Atroviolaceus, Harris.
Piceocinctus, Norton.

7 The males seldom have any middle under-wing cells.

8 Some of the males have one cell, and some no under-wing cells. A female has two cells in one under-wing, and one in the other. Some females have no middle under-wing cells.

9 *Strongylogaster multicolor* (n. sp.) ♂. (Length 0.24, Ex. 0.48 in.)
♂. Piceous, rufous, yellow and black; antennæ flattened, especially the third and fourth joints, third hardly longer than fourth, color piceous, two basal joints black; head yellow, with a large black vertical spot; clypeus angulate emarginate; thorax black; tegulæ, collar, a stripe on pleura, coxæ and base of femora yellow; abdomen and legs rufous or honey-yellow, a few black spots on basal segments of tergum; tarsi above blackish; wings hyaline, basal half of stigma bright yellow.
One specimen from Maryland; taken May 28. Mr. Uhler.
This resembles *Tenthredo semiluteus*, but can readily be distinguished by its short antennæ. It has no middle under-wing cells.

10 *Strongylogaster unicus* (n. sp.) ♀. (Length, 0.28, Ex. 0.56 in.)
♀. Color luteous, head and legs black; antennæ black, shorter than those of *tacitus*, third and fourth joints equal; clypeus rough with deep pits, not emarginate; mandibles rufous; tegulæ, edge of collar, basal plates, ovipositor sheath and legs black; anterior femora and tibiæ rufous before; wings blue-black, semi-transparent.
One specimen. New York. J. Akhurst.
In this and in *tacitus* the third submarginal wing cell is longer than in Tribe 1. The color of the body is paler than that of *tacitus*.

11 I see no difference in *T. tardus* and *T. atroviolaceus*, except in the color of the abdomen; the first being red, and the second black. I have a specimen with the basal segments only rufous, and have examined another with a rufous band on the third and fourth segments of abdomen, and the remainder black. Both sexes in both species have very long hinder tibiæ.

12 Not seen since first described; supposed to belong in this tribe.

Grandis, Norton.
[13] Ventralis, Say.
Flavomarginis, Norton.
[1] Externus, Say.
Lobatus, Norton.
Dissimilis, Norton.
Angulifer, Norton.
Signatus, Norton.
Verticalis, Say.
Mellinus, Harris.
Tricolor, Harris.
[1] Leucostoma, Kirby.
Rufipes, Say.
Rufopectus, Norton.
Californicus, Norton. Proc. Ent. Soc. Phil., 2, May and June.
[14] Punctatus, Norton. Proc. Ent. Soc. Phil. 1, 143.
[14] Semiluteus (n. sp.)
[15] Subcerulea, Eschscholtz Entomog. 1842. Unalaschka (Russ. Am.)
[15] Nigrofasciata, Eschscholtz Entomog. 1842. Unalaschka (Russ. Am.)

LIST OF SEVERAL SPECIES MISNAMED TENTHREDO.

Hylotoma clavicornis - - - -	Tenthredo clavicornis, Fab.
" cordigera - - - -	Tenthredo cordigera, Beauv.
" rubiginosa - - - -	Tenthredo rubiginosa, Beauv.
" thoracina - - - -	Tenthredo thoracina, Beauv.
Dineura obesus - - - - - - -	Allantus obesus, Say.
" litura - - - - - - -	Tenthredo (All.) litura, Klug.

[13] I have received a specimen of *ventralis* from Illinois, a male, which corresponds with Say's description.

[14] *Tenthredo semiluteus* (n. sp.). ♀ ♂. (Length 0.24–30 in., Ex. 0.50–65 in.)
♀. Black, yellowish-white and rufous; antennæ two-thirds the length of body, slender, luteous, the two basal joints, and a narrow line above, black; head greenish white; a large black spot on vertex, extending down between antennæ; clypeus not emarginate, its color, with labrum and mandibles, white; apical joints of palpi black; tegulæ, edges of collar, scutellum, pleura, and pectus pale-yellow or whitish; a large irregular black spot on pleura; abdomen and legs honey-yellow; a black spot in disc of basal membrane; coxæ and base of femora white; posterior femora nearly black above; wings hyaline, apical half of stigma and the costa luteous; marginal dividing nervure curved and received in middle of third submarginal cell.
♂. The male has its antennæ reddish-yellow; a black spot on upper side of two basal joints; apical segments of abdomen darkest; legs without spots.
Three specimens. Conn. and Pa. Dr. Clemens.
The antennæ and wings are very long, the body cylindrical, but shorter than usual. One specimen has but one middle under-wing cell, and the others none. Were the coxæ longer I should place it in *Pachyprotasis*.

[15] I have not seen the description of these species.

Dosytheus bicolor - - - - -	Tenthredo bicolor, Beauv.
Dolerus unicolor - - - - - -	Tenthredo unicolor, Beauv.
Emphytus articulata - - - -	Tenth. (Emph.) articulata, Klug.
Selandria bardus - - - - - -	Allantus bardus, Say.
" pygmæa - - - - -	Tenthredo pygmæa, Say.
" labiata - - - - - -	Tenthredo (All.) labiata, Klug.
" obtusa - - - - - -	Tenthredo (All.) obtusa, Klug.

Catalogue of the Birds found in the vicinity of Calais, Maine, and about the Islands at the mouth of the Bay of Fundy. By George A. Boardman.

The following list of birds was originally sent to me by Mr. Boardman, for my own use, and not intended for publication; but, finding that it was very complete and valuable for determining the geographical distribution of species, I requested him to publish it. This he could not attend to himself, and I have, with his consent, re-written it in a systematic form, adding, in some cases, observations made by myself at Grand Menan, in 1859, and now offer it for publication.

I have followed the classification adopted by Professor S. F. Baird, in the General Report on Birds (Vol. ix., P. R. R. Exp. and Surveys), except in a few instances where necessary changes have been made by others. In the *Tringeæ* I have adopted some judicious changes introduced by Mr. Elliott Coues, in his excellent monograph of that group (Proceedings of Phil. Academy, 1861, page 170), but have also given as synonyms the names used in the General Report.

A. E. Verrill.

Cathartes aura, Illig. Turkey Buzzard. Accidental. Only one instance.

Falco anatum, Bon. Duck Hawk. Resident. Breeds on cliffs at Grand Menan.

Falco columbarius, Linn. Pigeon Hawk. Resident. Not common. Breeds in hollow trees.

Falco candicans, Gm. ? Gyr Falcon. Only in winter. Very rare.

Falco sparverius, Linn. Sparrow Hawk. Summer visitant. Common. Breeds.

Astur atricapillus, Bon. Goshawk. Resident. Common. Breeds.

Accipiter Cooperii, Bon. Cooper's Hawk. Summer visitant. Rare.

Accipiter fuscus, Bon. Sharp-shinned Hawk. Summer visitant. Common. Breeds. Generally called "Pigeon Hawk."

Buteo borealis, Vieill. Red-tailed Hawk. Summer visitant. Common. Breeds.

Buteo pennsylvanicus, Bon. Broad-winged Hawk. Summer visitant. Common. Breeds.

Buteo lineatus, Jard. Red-shouldered Hawk. Probably resident. Common. Breeds.

Archibuteo sancti-johannis, Gray. Black Hawk. One last spring. Rare.

Archibuteo lagopus, Gray. Rough-legged Hawk. Not common.

Circus hudsonius, Vieill. Marsh Hawk. Summer visitant. Very common. Breeds.

Aquila canadensis, Cassin. Golden Eagle. Probably resident. Rare.

Haliœtus leucocephalus, Savig. Bald Eagle. Resident. Abundant. Breeds.

Pandion carolinensis, Bon. Fish Hawk. Summer visitant. Common. Breeds. Arrives April 10th; leaves September 15th.

Bubo virginianus, Bon. Great-horned Owl. Resident. Common. Breeds.

Scops asio, Bon. Mottled Owl. Resident. Not very common. Breeds.

Otus wilsonianus, Lesson. Long-eared Owl. Not very common. Breeds.

Brachyotus Cassinii, Brewer. Short-eared Owl. Not very common. Breeds.*

Syrnium cinereum, Aud. Great Gray Owl. Winter. Very rare.

Syrnium nebulosum, Gray. Barred Owl. Resident. Common. Breeds.

Nyctale Richardsoni, Bon. Sparrow Owl. Probably resident. Not common. This is " Tengmalm's Owl " of Audubon.

Nyctale acadica, Bon. Saw-whet Owl. Resident. Common. Breeds.

Nyctea nivea, Gray. Snowy Owl. Winter. Not common. A pair seen this spring, the last of May, probably had a nest.

Surnia ulula, Bon. Hawk Owl. Resident. Not very plenty. Breeds.

Coccygus americanus, Bon. Yellow-billed Cuckoo. Summer visitant. Common. Breeds.

Coccygus erythrophthalmus, Bon. Black-billed Cuckoo. Summer visitant. Common. Breeds.

Picus villosus, Linn. Hairy Woodpecker. Resident. Very common. Breeds.

Picus pubescens, Linn. Downy Woodpecker. Resident. Very common. Breeds.

Picoides arcticus, Gray. Three-toed Woodpecker. Resident. Not very common. Probably breeds.

Sphyrapicus varius, Baird. Yellow-bellied Woodpecker. Summer visitant. Common. Breeds.

Hylatomus pileatus, Baird. Black Woodcock. Resident. Common. Breeds.

* A nest of this bird was found at Grand Menan by Mr .Cabot. (See Proc. Bos. Soc., Vol. VI., p. 115.)

Melanerpes erythrocephalus, Sw. Red-headed Woodpecker. Summer visitant. Rare.

Colaptes auratus, Sw. Golden-winged Woodpecker. Summer visitant. Common. Breeds. Leaves the last of October. Generally called "Yellow Hammer."

Trochilus colubris, Linn. Humming Bird. Summer visitant. Common. Breeds. Seen from the last of April to last of Sept.

Chætura pelasgia, Steph. Chimney Swallow. Summer visitant. Common. Breeds. Arrives the first of May.

Antrostomus vociferus, Bon. Whip-poor-will. Summer visitant. Not very common.

Chordeiles popetue, Baird. Night Hawk. Summer visitant. Common. Breeds. Arrives the last of May.

Ceryle alcyon, Boie. Belted Kingfisher. Summer visitant. Abundant. Breeds. Seen from first of May to the middle of Sept.

Tyrannus carolinensis, Baird. King-Bird. Summer visitant. Abundant. Breeds.

Myiarchus crinitus, Cab. Great-crested Flycatcher. Summer visitant. Breeds.

Sayornis fuscus, Baird. Pewee. Summer visitant. Rare.

Contopus virens, Cab. Wood Pewee. Summer visitant. Not common.

Turdus Pallasii. Hermit Thrush. Summer visitant. Common. Breeds. Arrives 15th of April. Nests on the ground; eggs blue.

Turdus Swainsonii, Cab. Olive-backed Thrush. Summer visitant. Common. Breeds. Nests on low trees; eggs with blue ground color, and spotted.

Turdus migratorius, Linn. Robin. Summer visitant. Very common. Breeds. Arrives the first of April; sometimes seen in winter.

Sialia sialis, Baird. Blue Bird. Summer visitant. Very rare. Breeds.

Regulus calendula, Licht. Ruby-crowned Wren. Summer visitant. Rare.

Regulus satrapa, Licht. Golden-crested Wren. Summer visitant. Common. Breeds.

Anthus ludovicianus, Licht. Tit-Lark. Flocks seen occasionally in September.

Mniotilta varia, Vieill. Black and White Creeper. Summer visitant. Common. Breeds. Arrives the first of May; abundant about the 10th of May.

Geothlypis trichas, Cab. Maryland Yellow Throat. Summer visitant. Abundant. Breeds.

Helminthophaga ruficapilla, Baird. Nashville Warbler. Very rare.

Seiurus aurocapillus, Sw. Golden-crowned Thrush. Summer visitant. Common. Breeds. Arrives the first of May.

Seiurus noveboracensis, Nutt. Water Thrush. Summer visitant. Not very common. Breeds.

Dendroica virens, Baird. Black-throated Green Warbler. Summer visitant. Not very common. Breeds.

Dendroica canadensis, Baird. Black-throated Blue Warbler. Middle of May. Rare.

Dendroica coronata, Gray. Yellow-rumped Warbler. First of May. Common. Breeds. Arrives 25th of April.

Dendroica blackburniæ, Baird. Blackburnian Warbler. Summer visitant. Not very common. Breeds. Arrives the middle of May.

Dendroica castanea, Baird. Bay-breasted Warbler. Summer visitant. Rather rare. Arrives the middle of May.

Dendroica pennsylvanica, Baird. Chestnut-sided Warbler. Summer visitant. Common. Breeds. Arrives the middle of May.

Dendroica striata, Baird. Black-poll Warbler. Summer visitant. Common. Breeds.

Dendroica æstiva, Baird. Yellow Warbler. Summer visitant. Very common. Breeds. Arrives the second week in May.

Dendroica tigrina, Baird. Cape May Warbler. Summer visitant. Common. Breeds. Arrives the second week in May.

Dendroica palmarum, Baird. Yellow Red-poll Warbler. Summer visitant. Common. Breeds. Arrives from 20th to 25th April.

Myiodioctes pusillus, Bon. Wilson's Black Cap. Summer visitant. Not common. Arrives about the 10th of May.

Myiodioctes canadensis, Aud. Canada Flycatcher. Summer visitant. Common. Breeds. Arrives the middle of May.

Setophaga ruticilla, Sw. Redstart. Summer visitant. Abundant. Breeds. Arrives the middle of May.

Pyranga rubra, Vieill. Scarlet Tanager. Uncertain. Common in the spring of 1861.

Hirundo horreorum, Barton. Barn Swallow. Summer visitant. Common. Breeds. Arrives the first of May.

Hirundo lunifrons, Say. Cliff Swallow. Summer visitant. Common. Breeds. Arrives the first of May.

Hirundo bicolor, Vieill. White-bellied Swallow. Summer visitant. Common. Breeds. Arrives the middle of April.

Cotyle riparia, Boie. Bank Swallow. Summer visitant. Common. Breeds. Arrives the first of May.

Progne purpurea, Boie. Purple Martin. Summer visitant. Common. Breeds. Arrives the first of May; leaves the last of August.

Ampelis garrulus, Linn. Wax Wing. Accidental in winter.

Ampelis cedrorum, Baird. Cedar Bird. Summer visitant. Abundant from the first of June to the first of September.

Collyrio borealis, Baird. Shrike, Butcher Bird. Common in winter.

Vireo olivaceus, Vieill. Red-eyed Flycatcher. Summer visitant. Abundant. Breeds. Arrives the middle of May.

Vireo solitarius, Vieill. Solitary Flycatcher. Summer visitant. Not common.

Mimus carolinensis, Gray. Cat Bird. Summer visitant. Not very common. Breeds.

Troglodytes hyemalis, Vieill. Winter Wren. Resident. Breeds.

Certhia americana, Bon. American Brown Creeper. Summer visitant. Breeds. Arrives the first of May.

Sitta carolinensis, Gm. White-bellied Nuthatch. Resident. Breeds.

Sitta canadensis, Linn. Red-bellied Nuthatch. Resident. Common. Breeds.

Parus atricapillus, Linn. Chickadee. Resident. Abundant. Breeds.

Parus hudsonicus, Fors. Hudson Bay Titmouse. Resident. Not common. Breeds.

Eremophila cornuta, Boie. Shore Lark. Winter. Rare.

Pinicola canadensis, Cab. Pine Grosbeak. Winter. Common.

Carpodacus purpureus, Gray. Purple Finch. Summer visitant. Common. Breeds. Arrives the first of April.

Chrysomitris tristis, Bon. Yellow-Bird. Summer visitant. Common. Breeds.

Chrysomitris pinus, Bon. Pine Pinch. Resident. Breeds. Not very common in summer.

Curvirostra americana, Wils. Red Crossbill. Resident. Said to breed in winter.

Curvirostra leucoptera, Wils. White-winged Crossbill. Resident. Breeds in the winter.

Aegiothus linaria, Cab. Red-poll Linnet. Common first of the winter.

Plectrophanes nivalis, Mey. Snow Bunting. Seen at times in September.

Plectrophanes lapponicus, Selby. Lapland Longspur. Winter. Not common.

Passerculus savanna, Bon. Savannah Sparrow. Summer visitant. Common. Breeds. Arrives the first of April.

Poœcetes gramineus, Baird. Grass Sparrow. Summer visitant. Common. Breeds.

Coturniculus passerinus, Bon. Yellow-winged Sparrow. Summer visitant. Rare. Arrives the first of April.

Zonotrichia leucophrys, Sw. White-crowned Sparrow. Not common.

Zonotrichia albicollis, Bon. White-throated Sparrow. Summer visitant. Common. Breeds.

Junco hyemalis, Sclat. Blue Snow-Bird. Summer visitant. Very common. Breeds. Generally called "Chip Bird."

Spizella monticola, Baird. Tree Sparrow. Summer visitant. Common. Arrives from middle to last of March. Breeds very early.

Spizella socialis, Bon. Chipping Sparrow. Summer visitant. Common. Breeds. Arrives from middle to last of March.

Melospiza melodia, Baird. Song Sparrow. Summer visitant. Common. Breeds. Arrives early in March.

Melospiza palustris, Baird. Swamp Sparrow. Summer visitant. Breeds. Arrives last of March. Common first of May.

Passerella iliaca, Sw. Fox-colored Sparrow. Spring and fall. Common. Have not found it breeding.

Guiraca ludoviciana, Sw. Rose-breasted Grosbeak. Summer visitant. Rare.

Guiraca cœrulea, Sw. Blue Grosbeak. Very uncertain, but common in the spring of 1861.

Cyanospiza cyanea, Baird. Indigo Bird. Summer visitant. Rare.

Dolichonyx oryzivorus, Sw. Bobolink. Summer visitant. Common. Breeds. Arrives first of June; leaves first of September.

Molothrus pecoris, Sw. Cow Blackbird. Summer visitant. Not common. Breeds.

Agelæus phœniceus, Vieill. Red-wing Blackbird. Summer visitant. Common. Breeds.

Sturnella magna, Sw. Meadow Lark. Summer visitant. Very rare. Only one specimen seen.

Icterus spurius, Bon. Orchard Oriole. Summer visitant. Rare.

Icterus baltimore, Daud. Baltimore Oriole. Summer visitant. Very rare.

Scolecophagus ferrugineus, Sw. Rusty Blackbird. Common. Arrives in March.

Quiscalus versicolor, Vieill. Crow Blackbird. Summer visitant. Common. Breeds. Arrives first of April.

Corvus carnivorus, Bart. Raven. Resident. Not uncommon. Breeds on cliffs at Grand Menan, etc.

Corvus americanus, Aud. Crow. Resident. Abundant. Breeds.

Cyanura cristata, Sw. Blue Jay. Resident. Common. Breeds.

Perisoreus canadensis, Bon. Canada Jay. Resident. Common. Said to breed in March.

Ectopistes migratoria, Sw. Wild Pigeon. Summer visitant. Very uncertain.

Zenœdura carolinensis, Bon. Carolina Dove. Summer visitant. Rare.

Tetrao canadensis, Linn. Spruce Partridge. Resident. Common. Breeds.

Bonasa umbellus, Steph. Partridge or Ruffed Grouse. Resident. Common. Breeds.

Ardea herodias, Linn. Great Blue Heron. Summer visitant. Common. Breeds.

Botaurus lentiginosus, Steph. Stake Driver or Bittern. Summer visitant. Common. Breeds.

Butorides virescens, Bon. Green Heron. Summer visitant. Common. Breeds.

Nyctiardea Gardeni, Baird. Night Heron. Summer visitant. Not common.

Charadrius virginicus, Borck. Golden Plover. Autumn.

Aegialitis vociferus, Cas. Killdeer. Autumn.

Aegialitis melodus, Cab. Piping Plover. Summer visitant. Abundant. Breeds on islands the middle of June.

Aegialitis semipalmatus, Cab. Ring Plover. August and September. Plenty.

Squatarola helvetica, Cuv. Black-bellied Plover. Autumn. Not common.

Strepsilas interpres, Illig. Turnstone. Autumn. Rare.

Recurvirostra americana, Gm. Avoset. Spring of 1862, one specimen.

Himantopus nigricollis, Vieill. Black-necked Stilt. Spring of 1862, one specimen.

Phalaropus. A Phalarope is abundant in the Bay of Fundy, but the species is not determined.

Philohela minor, Gray. American Woodcock. Summer visitant. Common. Breeds. Arrives first of April; lays first of May.

Gallinago Wilsonii, Bon. Wilson's Snipe. Summer visitant. Common. Breeds.

Macrorhamphus griseus, Leach. Red-breasted Snipe. Summer visitant. Arrives first of April.

Tringa canutus, Linn. Ash-colored Sandpiper. August and September. Common.

Arquatella maritima, Baird. Purple Sandpiper. Winter. Abundant.

Ancylocheilus subarquata, Kaup. (Tringa subarquata, Temm.) Curlew Sandpiper. Not very plenty.

Pelidna americana, Coues. (Tringa alpina, Cassin.) Red-backed Sandpiper. August and September. Plenty.

Actodromas maculata, Cass. Jack Snipe or Pectoral Sandpiper. Autumn. Not common.

Actodromas minutilla, Coues. (Tringa Wilsonii, Nutt.) Least Sandpiper. Plenty. August and September.

of nearly pure white. Though resembling *P. Townsendii* somewhat in its dark colors and thickly spotted breast, it differs greatly in many respects. The bill is much shorter and thicker, the wings longer and the claws shorter. It is also considerably smaller than any specimen of *P. Townsendii* that I have seen. The colors above are rufous brown, with darker spots, instead of uniform dark, olive brown. The spots on the breast are also very different, these being very broad, triangular and very dark brown, without any shade of red in *T. Townsendii.* The under tail coverts are white, with only a tinge of brown, instead of dark brown, edged with yellowish.

P. schistacea, Baird, differs from it in having the upper parts and spots on the breast uniform slate, without any streaks on the back; in having longer claws and tail, and shorter wings. The spots on the breast are also broad, triangular and well defined, instead of being elongated and more or less linear, as in *P. obscura.* It resembles the latter, however, in having a stout, thick bill.

I at first supposed that the specimens described might be the young of *P. iliaca,* or some other species, but this is hardly probable, since one of the specimens was shot the first of July, when the young of none of the small birds had been seen large enough to leave the nest. But these specimens have every appearance of being fully adult, and Audubon expressly states that the young attain the adult plumage before leaving Labrador, the 1st of September, and he does not mention any change in their colors previously. But there are other differences that could not well be accounted for by age, such as the stoutness of the bill and claws, and differences in the proportions.

I am therefore led to believe that there are two species of *Passerella* in the eastern part of North America, corresponding to the two in the west. Then *P. iliaca* would be the eastern representative of *P. Townsendii,* and *P. obscura* of *P. schistacea.* But there is yet much to learn concerning the geographical range of all these species.

Of the other species referred to this genus by Bonaparte, *P. cinerea* (*Fringilla cinerea,* Aud.), *P. rufina* and *P. unalaschensis* appear to belong to the genus *Melospiza* of Baird. The two first are considered synonymous by him. They all agree in having elongated and acute bills, and the two first, at least, have the short, rounded wings of *Melospiza,* differing much, in this respect, from the species of *Passerella.* In color, however, *P. obscura* agrees nearer with *Melospiza rufina* of Baird than with any other bird with which I am acquainted, but the upper parts, and especially the rump and tail, are much more rufous. The bill, feet and wings are entirely different.

The remaining species, *P. hyperborea*, I have never seen, but the description given by Bonaparte does not apply to *P. obscura*. All of these doubtful species are from the north-west coast.

List of the Plants collected at Anticosti and the Mingan Islands during the Summer of 1861. By A. E. Verrill.

Owing to the numerous demands upon our time during the whole summer, the collection of plants did not receive so much attention as it deserved. Indeed, it often happened that collections that had been made were left in the botanical boxes until spoiled, for want of time to press them. The grasses, sedges, mosses and ferns were almost entirely neglected. But since there are some very interesting plants in the collection, and others which have not been previously obtained in that region, I have been induced to prepare the following list, incomplete as it is.

In the identification of many of the most difficult species, I have received much assistance from Mr. J. T. Rothrock, a student with Prof. Gray, while some of the most doubtful forms have been examined by Prof. Gray himself.

The collection, like those in other departments, was made jointly by all the members of the party.

The only list of plants from Anticosti that has been published before, of which I am aware, is that of the plants collected by J. Richardson in 1860; published by B. Billings, Jr., in the Annals of the Botanical Society of Canada, Vol. i., Part i., page 58. In that list there are 37 species enumerated, nearly all of which are in our collection. *Kalmia latifolia* is given, probably by some error, instead of *K. angustifolia*, which is common there.

All of the species in the following list are common at Anticosti, unless otherwise stated. The dates refer to the time when they were first found by us in flower.

Anemone parviflora, Michx. July 23. S. W. Point.
A. pennsylvanica, L. July 18.
Thalictrum Cornuti, L. July 18.
T. dioicum, L. June 26.
T. alpinum, L. Not in flower. Rare.
Ranunculus cymbalaria, Pursh. July 5.
R. aborticus, L. June 25.
R. acris, L. July 15. Ellis Bay.
Caltha palustris, L. July 5. Mingan and Anticosti.
Coptis trifolia, Sal. July.
Actæa spicata, var. *rubra*, Mich. June 25.

A. spicata, var. *alba*, Mich. June 25.
Nupha advena, Ait. July 17. Near Ellis Bay.
Sarracenia purpurea, L.
Turritis stricta, Gra. July 9. Anticosti.
Cochlearia tridactylites, DC. July 6. Niapisca Island, Mingan. This very rare and interesting plant was only found in one locality. It was there quite abundant.
Erysimum lanceolatum, R. B. July 4. Mingan, also at Anticosti.
Draba arabisans, Mich. June 26. Abundant.
D. incana, L. June 26. Abundant at Anticosti and Entry Island.
Sysymbrium sp. Specimens too imperfect for identification from cliffs near Jupiter River.
Cakile americana, Nutt. July 23.
Viola blanda, Willd. June 25. Heath Point.
V. cucullata, Ait. July 18. Nearly past flower. Not common.
V. palustris, L. July 23. S. W. Point.
Dròsera rotundifolia, L.
Parnassia parviflora, DC. July 23. Abundant at Anticosti on damp banks.
P. caroliniana, Mich. Aug. 6. Common at Anticosti.
Silene inflata, Smith. Aug. 1. In woods at Anticosti, some distance from the shore.
Honkenya peploides, Ehr. July 11.
Alsine grœnlandica, Fen. July 25.
Mœhringia lateriflora, L. June 26.
Stellaria longifolia, Muhl.
S. longipes, Gold. June 26. Abundant.
S. borealis, Big. July 18.
Cerastium vulgatum, L. Entry Island.
C. arvense, L. July 5. Mingan and Anticosti. Abundant.
Sagina nodosa, Henz. July 6. Mingan Islands.
Claytonia caroliniana, Mich. June 23. Entry Island.
Oxalis Acetosella, L.
Geranium Robertianum. July 9.
Impatiens fulva, Nutt. Aug. 1. Salt Lake.
Acer pennsylvanicum, L.
A. spicatum, Lam.
Trifolium pratense, S. July 17. Ellis Bay.
T. repens, L. Ellis Bay.
Vicia cracca, L.
Lathyrus maritimus, Big. June 26.
L. palustris, L. July 11.
Sanguisorba canadensis, L. July 18. Anticosti. Abundant.

Dryas integrifolia, Vahl. July 4. Mingan and Anticosti. Abundant. We did not meet with *D. Drummondii*, attributed to Anticosti by Pursh.
Geum strictum, Ait.
G. rivale, L. July 8.
Potentilla norvegica, L. Aug. 1.
P. anserina, L. June 25.
P. fruticosa, L. July 23.
P. tridentata, Ait. July 25. S. W. Pt., Ant.
Comarum palustris, Scop. Aug. 2. Near Salt Lake, Anticosti. Abundant.
Fragaria virginiana, Ehr. June 25; fruit Aug. 1.
F. vesca, L. June 25.
Rubus Chamæmorus, L. June 25, nearly past; fruit Aug. 2. Abundant.
R. arcticus, L. June 25; fruit Aug. 6. Common.
R. triflorus, Rich. June 25.
R. strigosus, Michx. June 25; fruit Aug. 14.
Rosa blanda, Ait. July 11. Junction Cliff, etc.
R. carolina, L. Aug. 6. Salt Lake, Ant.
Pyrus americana, DC.
Amelanchier canadensis, T. and G.
Epilobium angustifolium, L. July 10.
E. palustre, L. July 18.
E. alpinum, L. (var. *majus*, Wahl.)
Œnothera biennis, L. July 18.
Ribes hirtellum, Mich. June 25.
R. lacustre, Poir. June 25.
R. prostratum, L. Her. June 25.
R. floridum, L. June 29.
R. rubrum, L. June 25; fruit ripe Aug. 5.
Sedum Rhodiola. July 4.
Saxifraga grœnlandica, L. Very abundant at Mingan Islands. A very large number of specimens of this species, collected at Mingan, proves, according to Prof. Gray, who has examined them, that *S. grœnlandica*, *S. cæspitosa*, L., and *S. exarata*, Vill., are only forms of one species.
S. aizoides, L. (Large variety.) Aug. 5. Very abundant at Anticosti about limestone cliffs.
S. Aizoon, Jacq. July 5. Niapisca Island, Mingan.
Mitella nuda, L. June 29.
Sanicula marilandica, L. July 18.
Archangelica peregrina, Nutt. July 18.

Heracleum lanatum, Mich. July 15.
Conioselinum canadense, T. and G.
Ligusticum scoticum, L. Aug. 1.
Cicuta maculata, L.
Osmorrhiza brevistylis, DC. Aug. 1 in fruit. Anticosti. Not common.
Cornus canadensis, L. June 25.
C. stolonifera, Mich. June 26.
Linnæa borealis, Gron. July 9.
Lonicera cærulea, L. June 25.
Viburnum pauciflorum. July 4. Mingan Islands.
Galium triflorum, L.
Eupatorium purpurem, L.
Aster radula, Ait. Aug. 5.
A. carneus, Nees. Aug. 5.
A. Novi-Belgii, L. Aug. 6.
A. graminifolius, Pursh. July 23.
A. acuminatus, Mich. (Narrow-leaved variety.) Aug. 6.
A. nemoralis, Ait. Aug. 6.
Erigeron acre (*E. alpinum*, Hooker.) Narrow-leaved form. Aug. 10. Abundant on grassy banks near the mouth of Jupiter River.
Solidago Virga-aurea, L. July 23.
S. thyrsoidea, E. Mey. Aug. 1.
S. bicolor, L. (var. *concolor*.) Aug. 5.
S. arguta, Ait. (var. *juncea*.) Aug. 6.
S. altissima, L.
Achillea millefolium, L. (Purple var.) July 23.
Artemesia borealis, Pal. Aug.
Senecio aureus, L. Aug. 6.
S. pseudo-arnica. Aug. 1.
S. vulgaris, L.
Cirsium muticum, Mich. Aug. 1.
Leontodon autumnale, L.
Nabalus altissimus, Hook. July 18.
N. nanus, DC. July 25. S. W. Point.
N. racemosus, Hook. Aug. 5. S. W. Point.
Taraxacum Dens-leonis, Desf.
Lobelia Kalmii, L. Aug. 5. On limestone cliffs, Anticosti.
Campanula rotundifolia, L. July 9. Very abundant, with unusually large flowers.
Vaccinum Oxycoccus, L.
V. macrocarpon, Ait.
V. Vitis-Idea, L.

V. uliginosum, L. Anticosti and Mingan. Fruit ripe Aug. 6.
V. pennsylvanicum, Lam. July 5.
V. pennsylvanicum (var. *angustifolium.*) July 4. Mingan Islands.
V. corymbosum, L. July 6.
Chiogenes hispidula, T. and G. In fruit Aug. 15.
Arctostaphylos Uva-ursi, Spreng. July 5.
Cassandra calyculata, Don.
Andromeda polifolia, L. June 25.
Kalmia angustifolia, L. July 17.
K. glauca, Ait. June 25.
Rhodora canadensis, L. July 4.
Ledum latifolium, Ait.
Loiseleuria procumbens, Desv. Not in flower.
Pyrola rotundifolia, L. (var. *incarnata.*) July 9.
Moneses uniflora, Gray. July 11.
Monotropa uniflora, L. Aug. 1.
M. Hypopitys, L. Aug. 6.
Nemopanthes canadensis, DC.
Plantago major, S. July 10.
Primula farinosa, L. June 25. Abundant at Anticosti and Entry Island.
P. Mistassinica, Mich. June 25. Anticosti. Not abundant.
Trientalis americana, Pursh.
Glaux maritima, L. July 11.
Utricularia cornuta. Aug. 5. Anticosti.
Pinguicula vulgaris. July 5. Anticosti and Mingan Is. Abundant.
Euphrasia officinalis, L. July 9.
Rhinanthus crista-galli, L. July 23.
Mentha canadensis, L.
Mertensia maritima, Don. July 4. A form with glabrous leaves was occasionally met with.
Calystegia sepium, R. B. (var. *repens.*) Aug. 9. Salt Lake, Anticosti.
Halenia deflexa, Gris. Aug. 1. Abundant.
Gentiana detonsa, Fries. Aug. 10. Abundant on grassy banks near the mouth of Jupiter River.
G. acuta, Mich. Aug. 10. With the last, and also at S. W. Point. Abundant.
Pleurogyra rotata. Aug. 5. With the two preceding. Common.
Menyanthes trifoliata, L. Abundant.
Atriplex hastata, L. Aug. 1.
Polygonum viviparum, L. July 4. Abundant at Anticosti and Mingan.
P. amphibium. Aug. 6. Salt Lake.
Rumex domesticus (*R. longifolius*, DC.) July 8. Mingan Islands.

Shepherdia canadensis, Nutt. Common.
Comandra umbellata, Nutt. July 5.
C. livida, Rich. July 5. Mingan Islands.
Empetrum nigrum, L. Very abundant.
Urtica gracilis, Ait.
Betula papyracea, Ait. Abundant.
B. excelsa, Ait.
B. nana, L. July 6. Abundant.
Alnus viridis, DC.
Salix repens, L. (*S. arbuscula*, And.) July 4. Mingan and Anticosti.
S. reticulata, L. (var. *vestita*, And.)
S. (species undetermined.) Mingan Islands.
Populus balsamifera, L. Anticosti. Common.
Abies balsamea, Mar.
A. nigra, Poir. Abundant.
A. alba, Mich. Abundant.
Larix americana, Mich.
Juniperus communis, L.
Taxus canadensis, Willd.

A species of pine is mentioned by Richardson, but we did not meet with it.

Triglochin maritimum, L. July 9.
Gymnadenia tridentata, Lind. Aug. 6. Very abundant.
Platanthera rotundifolia, Lind. July 5. Common at the Mingan Islands.
P. bracteata, Torr.
P. dilatata, Lind. July 17.
P. hyperborea, Lind. July 19.
P. psycodes, Gray. Aug. 2. Salt Lake.
Goodyera repens, R. B.
Spiranthes cernua, Rich. Aug. 1.
Listera cordata, R. B. Aug. 6. Abundant.
Calypso borealis, Sal. July 5. Mingan Islands. Common.
Microstylis monophyllos, Lind. Aug. 5. S. W. Point.
Liparis Lœselii, Rich.
Cypripedium parviflorum, Sal. July 4. Anticosti and Mingan Islands. Very common.
Iris versicolor, L. July 4. Mingan Islands and Ellis Bay.
Smilacina racemosa, Desf. July 16.
S. stellata, Desf. June 25.
S. trifolia, Desf.
S. bifolia, Ker.
Clintonia borealis, Raf. June 25.

Allium. A species with tall scape and rose-colored flowers. Specimens too imperfect for identification.
Streptopus amplexifolius, DC. July 9. Common.
S. roseus, Mich. June 25. Common.
Zygadenus glaucus, Nutt. July 23. Very common.
Tofieldia palustris, Hudson. July 17. Marsh near Ellis Bay.
T. glutinosa. Aug. 5. Grassy banks. Very common.
Carex limosa, L.
C. aurea, Nutt.
Eriophorum russeolum. July 17. Ellis Bay.
E. vaginatum, L. July 17. Ellis Bay.
E. polystachyon, L.
E. alpinum, L.
Elymus mollis, Trin. (Goose grass.) Abundant.
Hierochloa borealis, R. and S. June 25. Common.

Mr. F. H. Storer exhibited a specimen showing the pseudometamorphism of cast-iron into plumbago, proving that iron is not, as might be supposed, a homogeneous mass; the plumbago had first been diffused through the mass, from which the iron had been afterwards removed by immersion for a long time in dilute acid. The casting came from Mr. Homer, of the Pacific Mills, Lawrence.

The following letters were read, viz: —

From the Royal Institution, September 12th, 1861; the Liverpool Literary and Philosophical Society, October 21st, 1861; the Naturhistorischer Verein, Bonn, January 22d, 1862, and the Regents of the University of New York, Albany, May 31st, 1862, acknowledging the receipt of the Society's publications; from the K. Preussiche Akademie, Berlin, February 18th, 1862, presenting its Monthly Journal for 1861.

Mr. E. H. Eldredge was elected a Resident Member.

DONATIONS TO THE MUSEUM.

April 16. A specimen of *Pocillopora* from the isthmus of Panama, by Mr. Charles F. Watts.

May 7. A collection of plants from the Arctic regions, by Dr. I. I. Hayes.

May 21. A collection of upwards of one thousand species of the plants of New England; a collection of plants of Minnesota; a large number of the nests and eggs of the birds of New England; a collection of Indian antiquities, consisting of stone implements of art and warfare, mostly from Concord, Mass., by the bequest of Mr. H. D. Thoreau; specimens of *Crioceris asparagi* from Fall River, by Mr. Norman Easton; two *Exocœtus* and two *Echeneis* from Newbern, N. C., by Dr. S. Kneeland ; a specimen of *Gammarus*, by Mr. T. J. Whittemore.

June 4. Copper pyrites from California, by Mr. T. J. Whittemore; a pair of the horns of *Bos caffer* from the Cape of Good Hope; a horn of the Sicilian cow; an *Elaps* from Rio Janeiro; a *Gecko* from Java; a beak of *Xiphius* and of *Pristes*, by Mrs. Kent; two specimens of an Orthopteron and an *Asilus* from Lima, Peru, by Dr. C. T. Winslow; two slabs of sandstone, from Middletown, Conn., containing fossil foot-prints, by Mr. Brainard; a *Pityophis* and a *Scincus*, from Newbern, N. C., by Dr. S. Kneeland.

June 18. *Umbrina nebulosa* from New Bedford, by Mr. William H. Taylor; *Ceratomia repentina* from Boston, by Dr. J. C. White.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1862.

United States Coast Survey. Report for 1860. 4to. Washington. *From Prof. A. D. Bache.*

Sixth Annual Report of the Secretary of the Maine Board of Agriculture. 8vo. 1861. *From C. H. Hitchcock, Esq.*

Annual Report of the School Committee of the City of Boston. 1861. 8vo. *From J. D. Philbrick, Esq.*

Annual of Scientific Discovery for 1862. 12mo. Boston. *From D. A. Wells, A. M., Editor.*

On the Rocks lying between the Carboniferous Limestone of the Lower Peninsula of Michigan and the Limestones of the Hamilton Group. By Alexander Winchell. 8vo. Pamph. New Haven, 1862. *From the Author.*

Manual of Elementary Geology. By Sir Charles Lyell. 8vo. London, 1851. *From Dr. S. Durkee.*

Otia Conchologica. By Augustus A. Gould, M. D. 8vo. Boston, 1861. *From the Author.*

Researches on the Molecular Dissymmetry of Natural Organic Products. By W. S. W. Ruschenberger, M. D. 8vo. Pamph. 1860. *From the Author.*

Mémoire sur la Mode de formation des Cones Volcaniques et des Cratères. Par G. Poulet Scrope. 8vo. Pamph. Paris, 1860. *From the Author.*

History of the Fishes of Massachusetts. By D. Humphreys Storer. 4to. pp. 195–240. *From the Author.*

Description of Remains of a new Enaliosaurian from the Coal Formation of Nova Scotia. By O. C. Marsh, B. A. 8vo. Pamph. 1862. *From the Author.*

Report on the Geological Survey of the State of Wisconsin. By James Hall and J. D. Whitney. 8vo. Vol. I. 1862.

Geological Survey of New York. Paleontology. By James Hall. 2 vols. 4to. Albany, 1859. *From Prof. James Hall.*

Check List of the Shells of North America. Unionidæ. By Isaac Lea, LL. D. 8vo. Pamph.

Papers on the Unionidæ, &c. By Isaac Lea, LL. D. Extracted from Proceedings of Academy of Natural Sciences of Philadelphia. 8vo. Pamph. 1862.

Observations on the Genus Unio. By Isaac Lea, LL. D. 4to. Pamph. Philadelphia, 1862. *From the Author.*

On the Tides of the Coast of Ireland. 8vo. Pamph.

Laws of Polarized Light. 8vo. Pamph.

Tides of Dublin Bay. 8vo. Pamph.

Healthy Urine of Man. 8vo. Pamph.

The Azimuthal Motion, &c. All by Samuel Haughton. 8vo. Pamph. *From the Author.*

Jahrbücher der K. K. Central-Anstalt fur Meteorologie und Erdmagnetismus. Von Karl Kreil. VIII. Band. Jahrgang, 1856. 4to. Wien, 1861.

Verhandlungen des Naturhistorischen Vereines der Preussischen Rheinlande und Westphalens. Achtzehnter Jahrgang. 8vo. Bonn, 1861.

Bericht über die St. Gallischen Naturwissenschaftlichen Gesellschaft. 1858–61. 8vo. Pamph. St. Gallen.

Jahrbuch der K. K. Geologischen Reichsanstalt, 1861–1862. XII. Band. Nro. 1. Jänner bis Dec. 1861. 8vo. Pamph. Wien.

Monatsbericht der Königlichen Preussischen Akademie der Wissenschaften zu Berlin. 8vo. 1861.

Schriften der Königlichen Physikalisch-ökonomischen Gesellschaft zu Königsberg. Zweiter Jahrgang. 1861. Erste Abtheilung.

Sitzungsberichte der K. Akademie der Wissenschaften. Nos. 6, 7, 8. June, July, Oct. 1861. 8vo. Wien.

Entomologische Zeitung. Zwei und Zwanzigster Jahrgang. 8vo. Stettin, 1861.

Nachrichten von der Georg-Augusts-Universitat und der K. Gesellschaft der Wissenschaften zu Göttingen. 1861. 12mo.

Archiv für Naturgeschichte. Sieben und Zwanzigster Jahrgang. Viertes Heft. Berlin, 1861.

Beiträge zur Anatomie und Entwicklungsgeschichte der Algengattung Lemanea. Von B. Wartmann. 4to. Pamph. St. Gallen. 1854.

Der Zöologische Garten. Nos. 7–13. 8vo. Pamph. Frankfurt a. M. April to Dec. 1861.

Bulletin de la Société de Geographie. 5ieme Serie. Tome II. 8vo. Paris, 1861.

Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome V. 8vo. 1861.

Memoirs of Geological Survey of India. Vol. III. Part I. 8vo. Calcutta, 1861.

Journal of the Geological Society of Dublin. Vol. IX. Part 1. 8vo. Pamph.

Notices of Proceedings of the Royal Institution of Great Britain. Part 11. 1860–61. 8vo. Pamph. Also, List of Officers, &c. 8vo. Pamph. London, 1861.

Proceedings of the Royal Society of London. Vol. VI. No. 1. 8vo. 1832. Pamph. Vol. XI. Nos. 44, 46. 8vo. 1861.

Report of Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire. 1860. 8vo. Pamph.

Annual Report of the Leeds Philosophical and Literary Society, for 1860–61. 8vo. Pamph.

Proceedings of the Royal Horticultural Society. Vol. I. pp. 696–724. 8vo. Pamph. London, 1861.

Canadian Naturalist and Geologist. Vol. VI. No. 2. April, 1862. Montreal.

Canadian Journal of Industry, Science, and Art. No. 38. March, 1862.

Annual Report of Montreal Horticultural Society. 8vo. Pamph. 1861.

Silliman's American Journal of Science and Arts. Vol. XXXIII. No. 99. May, 1862.

Proceedings of the American Philosophical Society. Vol. VIII. No. 66 to end of vol. 8vo. Philadelphia, 1862.

Proceedings of the Entomological Society of Philadelphia. March and April, 1862. 8vo. Pamph.

Proceedings of the Academy of Natural Sciences of Philadelphia. Nos. 1, 2, 3, 4. Jan. to April, 1862. 8vo. Pamph. *By Exchange.*

Quarterly Journal of the Geological Society. Nos. 67, 68, 69, 70, for Aug. and Nov. 1861, and Feb. and May, 1862.

Bydragen tot de Dierkunde. Long 4to. 7 Aflevering. 1848–54.

Contributions to the Natural History of the United States of America. By Louis Agassiz. Vol. IV. 4to. Boston, 1862.

Annals and Magazine of Natural History. Nos. 50, 51, 52, 53, for February, March, April, and May, 1862. *From the Courtis Fund.*

New England Historical and Genealogical Register. Vol. XVI. No. 2, for April, 1862.

Life and Letters of Washington Irving. By his nephew, P. M. Irving. Vol. I. 8vo. New York, 1862. *Deposited by the Republican Institution.*

September 3, 1862.

The President in the chair.

Dr. Jackson offered some remarks upon a new method of security against counterfeits in paper currency through the introduction of determinate species of Diatomaceæ into the material of the paper, or into some of the ingredients used in the preparation of the stamps; the method is the invention of Mr. D. J. Browne.

Mr. E. D. Cope, of Philadelphia, was elected Corresponding Member.

September 17, 1862.

The President in the chair.

Prof. J. Wyman stated that through the kindness of Prof. Agassiz, he had had an opportunity of studying the larvæ of *Dactylethra capensis* from South Africa. These larvæ are all considerably advanced in development, are from three to four inches in length, and have the hinder limbs more or less formed. The rudimentary fore limbs were protruded in all the specimens but one. In several respects they differ greatly from the larvæ of other Batrachians. The head is more flattened, the body is less rounded and longer, and the tail longer and more pointed. The mouth has none of the characteristics of Batrachian larvæ; it is wider, the lips are fleshy, have neither papillæ nor horny appendages on the lower lip, nor is there any beak on the upper. One of the most remarkable peculiarities, and which especially attracted the attention of Prof. Agassiz, is the existence at each angle of the mouth of a slender filament resembling that of the Siluroid fishes, and which, when placed beside the body, extends as far backwards as the legs. A series of hollow and inwardly corrugated teeth exist in the upper jaw as in the adult, but none in the lower.

The skin, like that of other larvæ, is mostly very thin, and of a dark-blue color. The back is covered with a patch of integument differing from that of the rest of the surface, which is thick, of a dark-brown color, and resembling that of the adult. In the older specimens patches of similar skin are seen on the nose and on the backs of the thighs and arms. These patches are the beginnings of the metamorphosis by which the larval integument is changed for that of the adult, and gradually extends over the whole body.

A series of linear groups of follicles begins at the hinder part of the middle line of the back, extends in a curve downwards on either side, ascends over the arms, and ends in a semicircle between each eye and the middle line of the head. On the back the series is partly double, and there are other groups of them over the shoulders.

The upper caudal fold of skin begins near the middle of the upper edge of the tail, where it is quite narrow, and continues so to the end. The lower fold is very much the broadest, and instead of ending at the base of the tail, as in other Batrachians, extends as far forward as the middle of the abdomen, having its greatest breadth between the legs. The end of the tail is sharply pointed; the anus perforates the caudal fold behind the abdomen as in other Batrachian larvæ.

The cavity of the mouth is large, is quite smooth, has no papillæ or palatine folds. In common Batrachians the gill-arches are composed of two distinct portions. First, an inner, consisting of a broad plate, on the sides of which are developed parallel rows of closely-attached fringes. Second, on the outer border of the arch and nearest to the respiratory opening, a series of dendritic fringes floating free, which are highly vascular, and which form the chief part of the respiratory surface. In the larva of Dactylethra here described, these last are entirely wanting. There are two outer respiratory openings, one on each side, instead of one on the left side, as is usually the case. These openings are in the form of fissures instead of tubes.

Another remarkable feature in the development of Dactylethra is that of the position of the fore limbs; these in common Batrachians are formed in the respiratory sacs just exteriorly to the gills; the left leg protruding outwards by the respiratory orifice, and the right by a corresponding opening on the right side, formed by the absorption of the skin for the purpose of freeing the limb. In Dactylethra the fore limbs are formed in special sacs, which are situated some distance behind the organs of respiration.

The urinary bladder is already somewhat developed, is formed relatively much earlier than in ordinary Batrachians, and in this respect more closely resembles a true allantois.

While in many respects the genus Dactylethra resembles Pipa, as in the conformation of the limbs, the single Eustachian tube, the absence of a tongue, and the broad transverse process of the coccyx, it differs widely from it in its phases of development, especially in the mode of the formation of the limbs and the position of them in the embryo.

Prof. J. Wyman gave an account of some experiments recently made by him on Planariæ, showing their power of repairing injuries.

One experiment consisted in cutting longitudinally the hinder half of one side of a Planaria. The incision began on the side, extending to the middle line, and then lengthwise, backwards to near the end of the body, so that the severed portion hung by a slender neck, and trailed backwards. At the end of the first day the separated portion was restored to its natural position, and by the third day was wholly united with the rest, the only indication of the injury being a small notch on the side.

In a second experiment the body was divided lengthwise from behind forwards for about two-thirds of the length of the animal. The divided portions completely cicatrized, but did not unite with each other, so that the Planaria remained permanently bifid behind.

In a third experiment the Planaria was divided in the middle transversely. The fore part continued to move as usual, but the hinder remained stationary. In the course of a few days the fore part reproduced what it had lost, and the hinder reproduced the head and eye specks, and thus two perfect animals were formed, both moving with perfect freedom.

Professor Carlo Matteucci, of Turin, was elected an Honorary Member.

DONATIONS TO THE MUSEUM.

September 3. Copper pyrites and erubescite, from Acton Vale Mine, C. E., by Dr. C. T. Jackson ; two bottles, containing a number of fishes, reptiles, and insects, from Newbern, N. C., by Dr. S. Kneeland; two specimens of *Acrochordes* from Hoogly River, and a *Scatophagus* and *Trichiurus* from off Madagascar, by Mr. R. Simonson.

September 17. *Corydalis cornuta*, from Milton, by Mr. J. Schohfield.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPT. 30, 1862.

On the Primitive Formations in Norway and Canada. By Thomas McFarlane. 8vo. Pamph. *From the Author.*

Geological Survey of Canada. New species of Lower Silurian Fossils. By E. Billings, F. G. S. 8vo. Pamph. Montreal, 1862. *From the Author.*

Cases in Surgery. Gun-shot Wounds. Plural Births. By J. Mason Warren. Pamph. Boston, 1862. *From the Author.*

Experiments and Observations upon the Circulation in the Snapping Turtle. By Mitchell S. Weir, M. D. 4to. Pamph. Philadelphia, 1862. *From the Author.*

The mode of Development of the Marginal Tentacles of the free Medusæ of some Hydroids. By A. Agassiz. 8vo. Pamph. 1862. *From the Author.*

Remarks on certain species of N. A. Helicidæ, etc. By Thomas Bland, F. G. S. 8vo. Pamph. New York, 1862. *From the Author.*

Monograph of the Species of Sphœrium of North and South America. By Temple Prime. 8vo. Pamph. Philadelphia, 1862. *From the Author.*

On the Genus Colias in North America. By Samuel H. Scudder. 8vo. Pamph. 1862. *From the Author.*

Défense des Colonies. Par J. Barrande. 2 Parts. 8vo. Pamph. 1861–2. *From the Author.*

Observations on the terms "Pénéen," "Permian," and "Dyas." By Jules Marcou. 8vo. Pamph. Boston, 1862.

Letter to M. Joachim Barrande, on the Taconic Rocks of Vermont and Canada. By Jules Marcou. 8vo. Pamph. Cambridge, 1862. *From the Author.*

Results of Meteorological Observations made by the United States Patent Office and Smithsonian Institution. 1854 to 1859. 4to. Washington.

Smithsonian Miscellaneous Collections. Vols. I.–IV. 8vo. Washington, 1862. *From the Smithsonian Institution.*

Memorias de la Real Academia de Ciencias de Madrid. Tomos 3, 4, 5. 4to. 1859–61.

Tijdschrift voor Indische Taal-, Land- en Volkenkunde. 18 Nos. 1857–60. 8vo. Pamph. Batavia.

Verhandelingen Van Het Bataviaasch Genootschaf van Kunsten en Wetenschaffen. Deel 27, 28. 4to. Batavia, 1860.

Archiv für Naturgeschichte. 1862. Acht und Zwanzigster Jahrgang. Erstes Heft.

Nachträge zu Maly's Enumeratio plantarum phanerogamicarum imperii austriaci universi. Von August Neilrich. 8vo. Pamph. Wien, 1861.

Schriften der Königlichen Physikalisch-ökonomischen Gesellschaft zu Königsberg. Zweiter Jahrgang, 1861. Zweite Abtheilung. 4to. Pamph.

Verhandlungen der Kaiserlich-Koniglichen Zoologisch-Botanischen Gesellschaft in Wien. Jahrgang, 1861. XI Band. 8vo.

Denkschriften der Kaiserlichen Akademie der Wissenschaften. Zwanzigster Band. 4to. Wien, 1862. Sitzungsberichte. Band 44. Heft 4, 5. 1861. Band 44. Heft 4, 5. 1862. 8vo. Wien.

Journal of the Royal Geographical Society. Vol. XXXI. London, 1861.

Proceedings of the Royal Geographical Society of London. Vol. V. No. 5, 1861, and Vol. VI. No. 3, 1862.

Quarterly Journal of the Geological Society. Vol. XVIII. Part III. London, Aug. 1862.

Proceedings of the Royal Horticultural Society of London. Vol. II. No. 1–3, 1862. Also, Nos. 6, 7, 8, 9 to 31 of Vol. I.

Journal of the Royal Dublin Society. Nos. 20–23. 1861.

Proceedings of the Royal Society. Vol. XI. No. 47. 8vo. Pamph. London.

Canadian Naturalist and Geologist. Vol. VII. No. 3, June. No. 4, August, 1862. Montreal.

Annals of the Botanical Society of Canada. Vol. I. Part III. 4to. April, 1861 to Feb. 1862.

Proceedings of the American Philosophical Society. Vol. IX. No. 67. 8vo. Pamph. Philadelphia, 1862.

Silliman's American Journal of Science and Arts. No. 101, for Sept. 1862.

Annals of the Lyceum of Natural History of New York. Vol. VII. Nos. 10–12. June, 1861.

Proceedings of the Academy of Natural Sciences of Philadelphia. No. 5, April and May, No. 6, June, 1862.

Proceedings of the Entomological Society of Philadelphia. May, June, and July, 1862. 8vo. Pamph. *By exchange.*

Annals and Magazine of Natural History. Vol. X. Nos. 54–57. June—Sept. 1862. London. *From Courtis Fund.*

Genealogical Dictionary of the First Settlers of New England. By James Savage. Vols. III. and IV. 8vo. Boston, 1862. *Deposited by Republican Institution.*

October 1, 1862.

Vice-President Jackson in the chair.

Mr. A. Agassiz gave an account of a new species of *Arachnactis* Sars, which is found swimming in large numbers near the surface of the sea, at night, during the last part of September. It is of a pale ochre color, and differs from the Norwegian species by its size, the length of the marginal tentacles, the arrangement of the row of tentacles round the mouth, and the manner in which it moves. On account of its great resemblance to the larva of our common starfishes he called it *Arachnactis brachiolata*. A full account of this Actinia will soon be published in the publications of the Society. Living specimens were brought to the Society for examination, and also larvæ of starfishes to compare with them.

Prof. William B. Rogers presented a paper by Dr. J. S. Newberry, entitled "Descriptions of the Fossil Plants collected by Mr. George Gibbs, Geologist to the United States North West Boundary Commission under Mr. Archibald Campbell, United States Commissioner. Referred to the Publishing Committee.

The Secretary read the following communication from Dr. James Lewis, of Mohawk, N. Y.: —

Since the autumn of 1853 I have devoted some attention to the mollusks of this immediate vicinity. My explorations and searchings for species and varieties have been, from the first, quite thorough, and have, I think, developed the fact that the number of aquatic species is being increased by the introduction of species from other parts of the State; while our local land species, if undergoing any change, must be diminishing, by reason of changes in the face of the country, making their former habitats untenable.

I propose to offer some remarks upon some aquatic species detected under such circumstances as to lead to the inference that they have been introduced.

Up to 1855 and 1856 the following species had not been detected, although as much and perhaps more attention had been devoted to *minute search* than since.

Paludina rufa Haldeman.	Observed	1856.
Melania virginica Gmel.	"	1858.
Melania? isogona Say.	"	1862.
Sphærium solidulum Prime *(var. distortum)*	"	1860.

Paludina rufa Hald. was first detected in the Erie canal within a somewhat restricted area, where it has been found since in considerable numbers, and of such a size as indicates a growth of five or six years (1860). This would date its introduction back at least to 1854 or 1855. Two years later, specimens which might have been developed in two or three years were found, but not very plenty (1856). Since that time (perhaps as early as 1857), a very few specimens were found in the Mohawk River, small, and of a somewhat different form and color from those found in the canal. Later (1862), they have been found there larger and more abundantly. The soft parts of this species present constant characters which separate

M. H. Niles

them from the species I have regarded as *decisa* and *integra*, which are abundant here. The shell of *P. rufa* may be called *ovate conic*, while the shells of *decisa (?)* and *integra (?)* are *conic*. This results from the greater angular divergence of the apical whorls of *rufa*, and the subsequent diminution of the *angle* of the body whorl. The *angle* for *decisa (?)* and *integra (?)* is constant in each, for all the whorls. The interior of *rufa* is colored pink, which in some specimens deepens to a faint purple, and also by reflection through the epidermis imparts a faint purple tinge to the exterior of the shell. The apical whorls are pink (externally), and contrast with the olivaceous hue of the larger whorls. In *integra (?)* and *decisa (?)* the apices are not colored, and if any contrast is shown with the larger whorls, it is due to a want of coloring matter in the apical whorls.

[There is some doubt about the identification of the shells of *decisa* and *integra*, and they may not be, and probably are not, the shells described by Mr. Say, though they are unquestionably the shells alluded to by DeKay.]

MELANIA VIRGINICA Gmel. was also first observed in the same portion of the canal where *Pal. rufa* was discovered. It has since been detected in other portions of the canal in somewhat greater numbers, but it yet remains a rare shell. This and *Pal. rufa* have, no doubt, been introduced from other portions of the State, on the bottoms of boats. Both species are found at the Eastern and Western terminus of the canal.

MELANIA ? ISOGONA Say, is a very recently-introduced species, the first and only specimens yet found having been taken within the last four weeks. They are probably introduced from Buffalo, at which point they have been detected by Mr. C. T. Robinson, of that city.

The few specimens I have been able to secure here enable me to correct an error in the generic nomenclature of this species. Mr. Say first noticed it as a Melania. It has since been catalogued by the Smithsonian Institute as an Anculosa (LEPTOXIS Raf.). The form of the shell suggests, however, different relations, and the soft parts confirm the suggestion that the animal belongs to the genus AMNICOLA, Hald. and Gould.

[I enclose herewith an enlarged sketch of the foot of the animal, as seen from below, through the side of a glass vessel, in which the animal was crawling. Foot white and translucent, with a recurved projecting angle on each side in front, widening a little posteriorly, and terminating in a slightly emarginate semicircle of a radius equal to one-half the width of the foot. Tentacles white, filiform, nearly straight, and of nearly equal diameter throughout; length of tentacles (as seen from below) about equal to the width of the foot at its narrowest part. Foot = 1⅓ length of shell.]

The specimens to which these notes refer are young; no adults have yet been found.

SPHÆRIUM SOLIDULUM Pr., found only in the Mohawk River. The shells are almost precisely identical with specimens received from Michigan. Until the present season very few have been seen, and those only young specimens. The present season, however, affords adults in considerable numbers, in isolated stations. It may be well to remark that this species does not seem to associate largely with *Sph. striatinum* Lk., which is an abundant species in the river. Each species seems to prefer its own station, but I am not able to state correctly the differences in their habits. This species has probably been introduced from the West. It bears a strong resemblance to *Sph. striatinum* Lk. (*similis* Say), differing by being smaller, a little more angular, and by the absence of striæ or *sulcations* on the umbo.

Among the shells of this region to which attention has been called heretofore, are a few which seem to need further attention.

A species of Amnicola is found here, which is, in Thompson's Vermont Shells (Adams), referred to *Pal. lustrica* Say. The shell in question is pupoid in form, the apical whorls having a large angle, and the subsequent whorls a diminished angle, almost cylindrical. The soft parts near the apex, as seen through the shell, are of an orange tint, resembling in that particular some of the Melanidæ. In other respects the soft parts are those of the genus Amnicola. This shell has been very widely distributed to my correspondents as "*Amnicola lustrica* Say," but it is probably the same species as described by Mr. Say as *Pal. grana*. (See Binney's edition of Say's Works, pp. 110, 111.) I am led to infer from Mr. Say's note to the description of *Pal. grana*, that his *Pal. lustrica* is similar to, if not identical with, *Valvata pupoidea* Gould.

Among the shells observed this season, it may be well to notice *Lymnæa gracilis* Jay.* On the 18th and 19th of August, I obtained over six hundred specimens of this species from the outlet of Schuyler's Lake, in Otsego County. A few years ago, in company with

* L. gracilis Jay has been found in the following locations:—
Lake Champlain, N. Y.
Schuyler's Lake, N. Y. (Lewis.)
Little Lakes, N. Y. (dead shells only). (Lewis.)
Niagara River, N. Y., in a small bay in an island about six miles below Buffalo. (C. T. Robinson.)
Lakes near Grand Rapids, Michigan. (McNiel & Currier.)
Lakes in Grattan, Michigan. " "

Mr. T. J. Whittemore, of Boston, I obtained a smaller number of the same species at the same locality, but under somewhat different circumstances. On the 5th of August (1859 ?) this species was found on the bulrush, growing in water from three to four feet deep, in considerable numbers, associated with Ancylus and Amnicola. The present season not presenting as high a stage of water, flag occupied the space previously covered by the bulrush, and no specimens were found there.

Those taken this summer were found about thirty rods lower down the creek, on eel-grass, in water varying from twenty to eight inches in depth. Most of the specimens were found near the roots of the plants, which were pulled up by the roots, with the mud adhering. Many of the shells were found almost imbedded in the mud, their apices pointing upwards, and to the casual observer presenting the appearance of an abortive leaflet. About nine out of ten were found with the apex pointing up. I have a large number of specimens in alcohol, which will enable me to supply specimens to any persons who may desire to study the soft parts. Very few of the specimens taken were of considerable size, and among them only one adult. The adult is characterized by the separation of the labium from the columella. The animals probably attain maturity late in autumn.

In the Erie Canal are found large numbers of *Sphærium striatinum* Lk. associated with *Sph. transversum* Say. I have observed that in early spring the former is nearly as abundant as at any other time of the year, while scarcely a specimen of the latter can be found. Later in the season *Sph. transversum* becomes more abundant and larger; and at the latter part of summer and beginning of autumn its numbers exceed those of *Sph. striatinum*, as is the case at the present time. The inference is that this species *(transversum)* is very prolific and of rapid growth; and judging also from the abundance of dead shells, just at the present time, it is probably very short-lived.

[Note. — In a communication to the Boston Society of Natural History several months ago, relative to Say's *Cyclostoma lapidaria*, that species was referred to Melania. Further researches will probably determine that, if it does not belong to the genus Melania, it may require to be set apart under a separate genus intermediate between Melania and Truncatella.]

October 15*th*, 1862.

The President in the chair.

Rev. Mr. Waterston announced the recent decease of Dr. B. D. Greene, of Boston, the first President of the Society. He spoke of the high personal character and scientific attainments of the deceased, and of the deep interest he ever felt in the welfare of the Society; in consideration of which, he moved that a committee of two be appointed to consider the best plan of procedure in reference to this loss. The President, Prof. Agassiz and Dr. Pickering followed, with remarks testifying to the great esteem in which Dr. Greene was universally held, and of his connection with the scientific world. Dr. Gould and Prof. Rogers were appointed as the committee, to which were afterwards added the names of Prof. Agassiz and Mr. Waterston.

The following paper was presented: —

NOTICE OF A SPECIES OF NEOSOREX FROM MASSACHUSETTS, AND OF SOREX THOMPSONI FROM MAINE. By A. E. VERRILL.

The genus *Neosorex* was instituted by Prof. S. F. Baird in 1857, in the General Report on Mammals (Vol. VIII. Pacific R. R. Exp. and Surveys), for the reception of a peculiar species of Shrew from Washington Territory, named *N. navigator.* To the same genus *Sorex fimbripes* of Bachman was also referred, with some doubt.

The diagnosis of the genus, according to Prof. Baird, is as follows: —

NEOSOREX, Baird.

"Ears rather short, partly furred on both surfaces; valvular.

"Dental formula: anterior incisors, $\frac{2}{2}$; lateral incisors and premolars, $\frac{5\text{-}5}{2\text{-}2}$; molars, $\frac{4\text{-}4}{3\text{-}3} = 32$; upper anterior incisor with a well defined hook at the base; lower one with two tubercles and a notch; first two upper teeth, or premolars, equal, and larger than the fourth, which exceeds the third, and equals the basal hook of the anterior one; the fifth smallest; the first and half the second lower lateral teeth placed above the base of the incisor; all the teeth colored at the tip. Lower angular process of lower jaw very long and slender. Tail as long, or longer than the body, with a terminal pencil; hairs uniform in length, except at tip. Feet well developed, with a fringe of stiff bristles.

"The genus bears a close resemblance to *Crossopus*, but differs in the more slender muzzle, in having one more molar, and two tubercles on the anterior lower incisor instead of one. With the feet similarly constituted, the tail is destitute of the median line of longer hairs. The very large and highly fringed feet distinguish it from *Sorex*."

In April of the present year, another species of this genus, which was obtained at Franconia, N. H., was described by Mr. E. D. Cope (Proc. Philadelphia Academy, 1862, p. 188), under the name of *Neosorex albibarbis*. Two individuals were seen by him swimming in a lake, about forty feet from the bank, with an undulatory motion, and were caught under stones on the shore, where they had taken refuge. For this aquatic mode of life the species of this genus are eminently adapted by their large, fringed feet, valvular ears, and close fur.

The subject of the present notice was obtained by Mr. F. W. Putnam, at Warwick, Mass., last July, and was presented by him to the Museum of Comparative Zoölogy. Nothing was learned concerning its habits. The specimen is preserved in alcohol, and, although somewhat larger than that described by Mr. Cope, agrees very closely with it in proportions and color, and must, unquestionably, be referred to the same species. But a careful comparison with the published descriptions and figures of *Sorex palustris* of Richardson has led me to consider it identical, also, with that species, notwithstanding some differences, real or apparent.

That the latter species belongs to the genus *Neosorex*, I infer from the description of Richardson (Fauna Bor. Am. I., p. 5), where the ear is said to be "shorter than the fur; its inferior margin is folded in; there is a heart-shaped lobe covering the auditory opening, and a transverse fold above it." The tail is rounded, and covered with a close coat of short hair, terminated by a small pencil of hair at the tip. "Feet clothed with rather coarse, short, appressed hairs, those on the sides of the toes being arranged somewhat in a parallel manner, but not very distinctly. The fur resembles that of the mole in softness, closeness, and lustre." The length of the tail was 2 inches and 7 lines; head 1 inch 2 lines; hind foot 9 lines, — dimensions not found in any other American genus. But, on the other hand, the dental formula is given as $\frac{2}{2} + \frac{4-4}{2-2} + \frac{4-4}{3-3} = 30$; and the length, from nose to tail, is 3 inches 6 lines. In my opinion, these characters, which are different from those of *N. albibarbis*, can be attributed to the imperfections of the description of Richardson, for it was, as he himself states, "drawn up from prepared skins," which, of itself, is enough to explain the greater size of the body. The principal difference is in the presence of *four* upper premolars instead of *five;* but in the specimen before me the fifth premolar is very small, and destitute of the brown color at the tip, while it is so placed between the fourth premolar and first molar, that it could not be seen without cutting away the lip, and with a prepared skin, it is not surprising that it should have been overlooked even by so accurate an observer as the distinguished author of the Fauna Boreali-Americana.

An additional confirmation of this view of its generic affinities may be derived from the fact that Dr. J. E. Gray, having the original specimen of Richardson for examination, referred it to the genus *Amphisorex*, which he characterized as having *fringed feet.* (See Pr. Zoöl. Soc. Lond., v. 1837, p. 125.)

Admitting, then, that *Sorex palustris* of Richardson belongs to the genus *Neosorex*, its identity with *N. albibarbis*, Cope, remains to be shown.

The proportions, and even the absolute size of the former (excepting that of the body, which was, probably, overstuffed), agree very closely with those given by Mr. Cope, as the following comparison will show.

	N. albibarbis, Cope.		Sorex palustris, Rich.	
	Inches.	Lines.	Inches.	Lines.
Length of head and body	2	$8\frac{1}{2}$	3	6
Length of head	1	$2\frac{1}{2}$	1	2
Length of tail	2*	9	2	7
Length of hind foot		$8\frac{3}{4}$		9
From nose to eye				7
Nose to upper incisors, scarcely				2
Height of ear				3
Length of fore foot		$4\frac{1}{2}$		
Nature of specimen	In alcohol.		Prepared skin.	

It is very seldom that two specimens of the same species, among mammals, agree more nearly, in proportions and size, than these.

The principal difference seems to be in color; but both are remarkable for their dark tints. According to Richardson, the back is "black, with a slightly hoary appearance when turned to the light." "On the ventral aspect it is ash-colored." "The outside of the thighs and upper surface of the tail correspond in color with the back, the under surface of the tail and inside of the thighs with the belly." "The feet are paler than the back, and a little hoary." According to Cope, "The general color is black, with a tinge of brown; this tinge is more apparent on the abdomen, and most upon the

* In the original description the length of the tail is given as "1 in. 9 lines," but Mr. Cope has informed me, by letter, that this is an error, and should be 2 in. 9 lines.

posterior gular region; anterior gular region and chin nearly white, lightest anteriorly; tail unicolor."

By a comparison of the two descriptions, it will be seen that the principal difference in color is in the lighter hue of the lower surface of the body and tail in Mr. Richardson's specimen; but if his was, as his remarks imply, taken in the winter, and Mr. Cope's in summer, this difference would fall within the variation according to season known among other species of shrews. The specimen from Warwick, though ashy brown beneath, has the tips of the fur hoary, and the under surface of the tail light ash, — much lighter than the upper surface. In other respects the color agrees very well with Mr. Cope's description. It was, also, taken at about the same season.

Admitting the correctness of my identification of this species, the known representatives of the genus *Neosorex*, which is, as yet, known only in North America, will be as follows: —

NEOSOREX NAVIGATOR.

Sorex navigator, J. G. Cooper. MSS.

Neosorex navigator, S. F. Baird, General Report on Mammals, Pacific R. R. Exp. and Sur., Vol. VIII. p. 11, pl. XXVI. 1857.

Fort Vancouver, Washington Territory. — Dr. J. G. Cooper.

NEOSOREX (?) FIMBRIPES.

Sorex fimbripes, Bachman, Journ. Ac. Nat. Sc. Philad., VII., p. 391, pl. XXIV., f. 8. 1837. Audubon and Bachman, N. A. Quad., Vol. III., p. 312. (Copied from preceding.) 1854.

Neosorex (?) fimbripes, S. F. Baird, General Report on Mammals, P. R. R. Exp. and Sur., VIII., p. 11. 1857.

Sorex fimbripes, S. F. Baird, l. c., page 55. 1857.

Drury's Run, Lycoming Co., Pennsylvania. — W. R. Johnson. Only one specimen is yet known.

NEOSOREX PALUSTRIS.

Sorex palustris, J. Richardson, Zoöl. Journal, III., p. 516, Jan.–April, 1828. J. Richardson, Fauna Bor. Am. Vol. I., p. 5. 1829. Audubon and Bach., N. A. Quad., Vol. III., p. 108, pl. CXXV. (Description copied from Richardson; figure from his original specimen, which is in the British Museum.) 1853. S. F. Baird, l. c., Vol. VIII., p. 55. 1857.

Amphisorex palustris, J. E. Gray, Proc. Zoöl. Soc. of Lond., Vol. V., p. 125. 1837.

Crossopus palustris, Wagner, Suppl. Schreber, Vol. V., p. 542. 1855.

Neosorex albibarbis, E. D. Cope, Proc. Philad. Acad. Nat. Sc., p. 188. 1862.

Hudson Bay region, inhabiting the borders of lakes. — J. Richardson. Franconia. N. H., swimming in a lake. — E. D. Cope. Warwick, Mass. — F. W. Putnam.

Description of a specimen of Neosorex palustris (No. 1022 M. C. Z.) *from Warwick, Mass.* This specimen is a female preserved in alcohol, and is not much, if at all, contracted. Form rather full and stout, similar in size and general appearance to the common house mouse (*Mus musculus*). Nose long and rather slender, with a small bilobed tip; nostrils lateral, and pretty well developed. Ears small, appearing pointed, shorter than the fur, and concealed by it; concha small and rounded, its edge covered by rather long fur, its outer side by shorter; a narrow transverse fold extends across its lower portion, which is likewise furred on the edges; meatus covered by a large valvular antitragus, which is rounded and hairy at its outer edge, its anterior margin folding backwards to unite with the helix. Eyes moderately developed. Feet large and stout, nearly destitute of hair, except along the sides, where there is a strong fringe of close and stiff hairs; a shorter fringe borders the sides of all the toes. At the base of the 1st, 2d and 5th toes there is a round tubercle, another between the bases of the 3d and 4th, and two, side by side, about midway between the heel and base of middle toe; the tubercles on the fore feet are arranged in a similar way, but are much more crowded. Fore foot contained one and two-thirds times in the length of hind foot. Tail equal in length to head and body, rather large, somewhat quadrangular near the base, covered by closely appressed, short, stiff hairs, with a distinct pencil at the end. Whiskers black, well developed, the longest reaching the occiput.

In this specimen the upper lip is not split to the end of the nose, as is usual in species of *Sorex*. This will probably be found to be a generic character.

Teeth strong and sharp, the tips of all, except the fifth upper premolar, deep chestnut; upper incisors with a strong basal hook, equalling in size the third upper premolar, which is somewhat smaller than the two first; fourth premolar larger than the third; fifth very small, wedged in between fourth premolar and first molar, scarcely visible from the outside; lower incisors with three rounded serrations, their bases extending back beyond the tips of the second lower premolars.

Color above nearly black; the fur, at base, is dark plumbeous, near the ends black, the extreme tips being light gray, giving a slight hoariness to the fur; under surface of the body dark lead gray, with a distinct wash of brown; throat light gray; chin nearly white; feet and tail black, the tail somewhat lighter beneath. The colors of the back and abdomen pass into one another, without any distinct line of separation. The fur is very close and full, and of moderate length.

COMPARATIVE MEASUREMENTS.

	N. palustris (1022)	N. navigator (629)
	Inches.	Inches.
Nose to tip of tail	5.60	5.17
" " root of tail	2.80	2.17
" " occiput	.95	.92
" " tip of ear	1.05	
" " eye	.45	
" " extended hind foot	3.80	
Length of tail to tip	2.80	3.00
" " tail to end of bone	2.68	2.83
" " fore leg from knee	.85	
" " fore foot	.42	.38
" " hind leg from knee	1.40	
" " hind foot	.71	.79
" " longest toe	.27	.25
" " whiskers	.75	
Between eyes	.35	
Between extended feet	3.30	

The measurements of *Neosorex navigator* are taken from those given by Prof. Baird, the first five having been made from the alcoholic specimen, and the others after skinning. From this species *N. palustris* differs in having a shorter tail, although a larger species; a *shorter* hind foot and *longer* fore foot; in its much darker colors, even the specimen described by Richardson being much darker than that of *N. navigator*, described by Baird, while the two known specimens, in summer pelage, are still darker.

From *N. (?) fimbripes* it differs still more widely; the latter being but $3\frac{7}{8}$ inches in length to tip of tail, with the body $1\frac{1}{8}$; head 1; tail $1\frac{3}{4}$; while the hind feet are only .50 in. instead of .71; so that it is not only a much smaller species, but has disproportionately shorter hind feet and tail.

Sorex Thompsoni, Baird.

Among the twelve North American species belonging to the restricted genus *Sorex*, so fully described by Prof. S. F. Baird, in the General Report on Mammals, this species is remarkable for its small size, it being, in fact, the smallest mammal known to inhabit North America. The three specimens examined by Prof. Baird came respectively from Halifax, N. S., Burlington, Vt., and Zanesville, Ohio.

In the Museum of Comparative Zoölogy there are two specimens preserved in alcohol; one of which was collected by Prof. Charles E. Hamlin, at Waterville, Me., the other by myself at Norway, Me. Since these specimens afford additional information concerning the characters and variations of this rare and interesting species, I have prepared descriptions and measurements of each.

Description of a specimen from Norway, Me., in alcohol (No. 684 M. C. Z.). This specimen seems to be a fully adult female, and is in a good state of preservation, though it is probable that the body is somewhat contracted and measures less than when fresh. Teeth $\frac{2}{2}$—$\frac{4\cdot4}{2\cdot2}$—$\frac{4\cdot4}{3\cdot3}=30$; premolars not imbricated, the first two about equal, considerably larger than the third and fourth, not exceeding the basal hook of the upper incisors. Form rather more thick than usual in this genus, but very small and delicate; legs very slender; feet very small; the fore feet contained about $1\frac{1}{2}$ times in the hind ones; nose short, conical, pointed, scarcely depressed, much less elongated than that of *S. Cooperi;* ears large, but projecting only a little beyond the fur; eyes larger than usual in the genus; tail slender, about $3\frac{1}{2}$ times the length of the hind foot, pretty well furred, with a distinct pencil of hair at the tip; whiskers well developed, numerous, about $\frac{1}{2}$ in. long.

Color of body, head and tail, above, dark olive brown with a slight hoariness; under surface of body light plumbeous gray; lips, chin, feet, and lower side of tail, yellowish white; tips of the teeth dark chestnut brown; the lower incisors have two strong serrations; feet with a distinct fringe of fine, close hairs, as in *S. Cooperi.*

Description of a specimen in alcohol from Waterville, Me. (No. 1164 M. C. Z.*).* This specimen was taken July 14. It is a male, and does not appear to be fully adult. The body is somewhat mutilated and evidently stretched beyond its natural length.

Form very small and slender, agreeing in all respects with the last, except that the body appears longer; teeth agreeing in number and relative size with those of the last, but shorter; premolars less pointed; incisors shorter, the lower ones without serrations; the tips of most of the teeth are light chestnut, but this is scarcely apparent on the premolars. Color, above, dark gray or plumbeous, with a distinct wash of brown along the middle of the back; the tips of the hairs on the sides tinged with the same; body beneath grayish white; the lips, chin, feet, and tail, whitish, as in the former specimen; pencil of hair at tip of tail very small. Proportions as in the preceding. Feet, as in several other species of this genus, furnished with a short but distinct fringe of fine hairs; upper surface pretty well furred.

This specimen agrees very closely with *Sorex Hoyi*, described by Prof. Baird, from Racine, Wis., and renders it probable that the latter species is only a variety of *S. Thompsoni*, depending upon age or season, as was suggested by Prof. Baird. The proportions are nearly the same, and the colors similar, being much lighter than in the preceding specimen.

COMPARATIVE MEASUREMENTS IN INCHES.

	S. Thompsoni, ♀, Norway, Me. (No. 684.)	S. Thompsoni, ♂, Waterville, Me. (No. 1164.)	S. Cooperi, ♀, Danvers, Mass. (Essex Inst.)	S. platyrhinus, ♀, Warwick, Mass. (No. 1163.)	S. personatus, ♀, Louisiana. (Essex Inst.)
Nose to tip of tail	2.90	3.20	3.75	3.80	3.15
" " occiput	.75	.75	.80	.87	.75
" " root of tail	1.53	2.00	2.00	2.25	2.00
" " extended hind foot	2.09	2 60	2.62	3.00	2.50
" " tip of ear	.66	.70	.87	.90	.85
" " eye	.30	.30	.35	.36	.33
" " posterior angle of mouth	.25	.25	.23	.31	.25
Length of tail vertebræ	1.17	1.15	1.50	1.50	1.10
" " tail to tip	1.38	1.23	1.75	1.55	1.15
" " ear	.21	.25	.25	.26	.30
" " snout	.13	.14	.15	.17	.13
" " whiskers	.50	.50	.60	.65	.55
" " leg from knee	.75	.80	.90	.96	.80
" " foot	.40	.38	.45	.50	.40
" " arm from elbow	.42	.45	.57	.56	.50
" " hand	.22	.23	.28	.26	.26
Greatest distance between extended feet	1.72	2.05	2.50	2.63	2.25

In color and general appearance, this species resembles *S. Cooperi*, but is considerably smaller.* The latter has also 32 teeth instead of 30; its nose is longer and much more attenuated; its tail is disproportionately longer and larger, and its feet and ears are much larger, though of about the same form.

In proportions, size and form, *S. personatus*, of the South, resembles it still more closely, but its color is a light chestnut brown. It also has 32 teeth; a shorter tail, though a somewhat larger species in other respects; and the ears are much longer and less rounded, and have much more hair on the inside of the concha. The specimen measured belongs to the Essex Institute.

S. platyrhinus differs greatly from it, being much larger and stouter; having a disproportionately longer tail and hind feet, the latter being about twice the length of the fore feet; possessing 32 teeth, with the five premolars imbricated; and having a much broader and depressed nose, which is not longer in proportion. The color, also, is different, being in the latter species nearer chestnut-brown, with scarcely any shade of olive-brown even on the back; while the feet, under surface of the tail, and a broad space around the mouth, including the lips and chin, are nearly pure white; the feet are nearly destitute of hair in my specimens, and have no fringe along the sides. The ears, also, are more distinctly rounded, whiter, and less hairy.

* The specimen of *S. Cooperi*, from Danvers, Mass., of which the measurements are given in the table, is the smallest one that I have ever seen, of this species. It belongs to the collection of the Essex Institute.

The specimen measured, in the table, was presented to the Museum of Comparative Zoölogy by F. W. Putnam.

S. Fosteri differs from it in nearly the same characters as does *S. platyrhinus*, these two species being very closely allied.

List of the Species of the Family Soricidæ, known to inhabit New England.

The seven species belonging to this family, that are considered as belonging to the fauna of New England, may be arranged as follows:

Neosorex, Baird.

Neosorex palustris, Verrill. (*Sorex palustris*, Rich.) Range from Hudson's Bay to Franconia, N. H., and Warwick, Mass.

Sorex, Linn.

Section A, *with five upper premolars. Teeth,* $\frac{2}{2}$ — $\frac{5-5}{3-3}$ — $\frac{4-4}{2-2}$ = 32.

Sorex platyrhinus, Linsley. (*Otisorex platyrhinus*, Dekay.) (*Sorex Fosteri*, Thompson, Nat. Hist. Vt.)

Known range, from Norway, Me., and Burlington, Vt., to Cleveland, Ohio. In Massachusetts much more common than any other species of this genus.

Sorex Fosteri, Rich.

Range from Hudson's Bay (Rich.) to New York (Bachman), and Carlisle, Penn. (Baird). This species has been mentioned, by authors, from New England, but I have never met with a specimen myself. It is possible that the species, as described by Richardson, is not identical with that of Bachman from New York, or of Baird from Pennsylvania.

Sorex Cooperi, Bachman.

Range from Labrador to Nebraska, south to West Northfield, Ill., and Western New York. The only specimen that I have seen from New England is from Danvers, Mass., in the collection of the Essex Institute.

Section B, *with four upper premolars. Teeth,* $\frac{2}{2}$ — $\frac{4-4}{3-3}$ — $\frac{4-4}{2-2}$ = 30.

Sorex Thompsoni, Baird. (*S. Thompsoni and* (?) *S. Hoyi*, Baird.) Range from Halifax, N. S., Norway, Me., Waterville, Me., and Burlington, Vt., to Zanesville, Ohio, and (*S. Hoyi*) Racine, Wis.

Blarina, Gray.

Blarina talpoides, Gray. (*Sorex talpoides*, Gapper. *Sorex Dekayi*, Bach.)

Range from Nova Scotia, Upper Canada and Northern Maine to Lake Superior, and south to Ohio, Pennsylvania and mountains of Virginia and Georgia. This is more abundant in New England than any other species of this family, frequenting chiefly moist woods and meadows, and taking readily to the water when disturbed. *Blarina brevicauda* of Dekay, Thompson, and several other authors (not of Say), is included here as a synonym of this species.

Blarina angusticeps, Baird.

Burlington, Vt. (Baird), near Sebago Lake, Me. (Prof. Agassiz). This very rare but interesting species is as yet known from only two specimens. It is quite peculiar in the form and narrowness of the skull, but resembles, externally, the preceding species. Its color is uniform plumbeous, scarcely paler beneath.

Mr. F. W. Putnam exhibited specimens of the "Red-backed Salamander," *Plethodon erythronotus*, Baird, with the eggs and young in different degrees of development, which he had found under the moss and bark of decayed trees in the woods at Warwick, Mass., on the 26th, 27th and 29th of August last. The eggs were quite large, measuring .15 inch in diameter, and were found in little packets of from six to eleven each; some five or six of these bunches were found during the three days' search, also a number of young evidently just hatched, as they still retained their gills; those that he hatched from the eggs lost their gills in less than three days from the time of their casting the egg envelope. When just from the egg the young measured .6 inch in length, and had the marking and color of the adult, with the exception of the dorsal vermilion band being lighter, and extending to the tip of the tail. In three instances out of five in which the young were found there was an adult specimen with them, and apparently feeding them with small snails (Limax), as remains of the slimy substance of the snails were found, and, in one case, a partially decomposed or eaten snail was seen in the midst of the little family. When discovered by itself the adult animal quickly disappears in the decayed wood and moss, but in every case when found with the young, neither it nor the little ones attempted to escape until touched. The only reference that he could find in regard to the eggs of this species is in Prof. Baird's "*Revision of the Tailed Batrachians of North America*," where it is stated that they are "deposited in packets under damp stones."

Mr. Putnam called attention to the few observations that had been made upon the habits and development of our salamanders and newts.

The President stated that he had found the eggs of the same species at two widely different seasons; early in June at Fitchburg, in this State, and in the middle of August at the White Mountains.

Prof. Agassiz referred to the difference in the time of development in *Rana temporaria*, in the Alps and Lowlands, in the latter of which the eggs are laid in March and April, and attain their development the same season, while on the mountains they are laid in June, and remain in the tadpole state during the winter.

The President alluded to a remarkable case of poisoning, which had occurred, as was alleged, by the introduction of the anther of a tiger lily (*Lilium tigrinum*) into the nostril of a child, causing inflammation, followed by vomiting, and finally by death.

Upon request, Prof. Agassiz gave an account of the conclusions at which he had arrived by the study of tertiary fossils in reference to the division of the strata in which they occur. He was satisfied that the primary divisions given by Lyell were natural, although the subdivisions are much more numerous, and the basis upon which the larger groups had been founded was erroneous; the relations of one group of beds to another being correctly based upon a percentage of species, representative of, rather than identical with, those now living. He was further satisfied that the principles upon which fossiliferous deposits of distant regions had been synchronized, namely, by the similarity of their organic forms, was entirely erroneous, since such fossils, even when unquestionably cotemporaneous, showed frequently, when compared together, greater differences than the fossils from successive horizons in the same country.

November 5, 1862.

The President in the chair.

The committee appointed at the previous meeting to take suitable action with reference to the decease of Dr. B. D. Greene, being called upon, —

Dr. A. A. Gould offered some preliminary statements with regard to Dr. Greene's connection with the early history of the Society, and then gave place to the introduction of resolutions by Professor W. B. Rogers.

Professor W. B. Rogers said that before submitting to the Society the resolutions which he held in his hand, he was desirous of making a few remarks on the important services and peculiar virtues of our late valued friend and associate. He felt, indeed, that it was especially incumbent on him to offer in person a tribute of honor and gratitude to the memory of the deceased, as on a former occasion, when called upon to address the Society in public, his imperfect knowledge of its early history had led him to overlook the distinguished part which Dr. Greene had taken in the formation and in the early nurture and guidance of the Society.

It will be gratefully remembered by us all, that our associate, feeble as was his health at the time, united with us on that occasion in the celebration of our thirtieth anniversary. Who can doubt that a nature less noble than his would have seen, in the omission here referred to, a just cause for displeasure as well as surprise. But the large heart of our associate was too deeply interested in the *good results* of the zeal and liberality in which he had so earnestly shared to be much concerned about any apportionment of the honors so justly due to himself and the other founders and early friends of the Society. Soon after this occurrence, his usual kindly smile and cordial greeting gave touching proof that the much-regretted omission was as fully and freely forgiven as it had been unconsciously and innocently made.

Without attempting a review of the scientific attainments and services of Dr. Greene, for which only the intimate and honored associates of his labors would be qualified, Professor Rogers begged simply to bring to the minds of the Society two points in the life and character of their late friend and associate, from which, as he thought, the wealthy and the learned here and everywhere might reap instruction.

It is not often that the possessor of a liberal fortune is found giving his heart and time to the labor of scientific studies, which, however ennobling and replete with the purest of enjoyments, have, as we know, nothing in sympathy with the luxurious ease and brilliant excitements of what is called society. It is true that in the higher civilization to which the world is advancing, it may be confidently expected that the cultivation and promotion of knowledge and the nurture of all good enterprises will be recognized as the duty, and will become the noble aspiration of all whose wealth offers them at once the leisure and the facility for such tastes and labors. Indeed, we already see among the most advanced communities bright auguries of this lofty social development, and in our city and State we may proudly point to many an example of affluence ennobled by large and profound culture, as well as by unstinted liberality in support of education and whatever else conduces to the happiness and progress of our race. Yet, it must be confessed that such tastes and labors as marked the life of our late colleague are still the exception, rather than the rule, and we are therefore especially called on to honor the memory of him who has furnished so beautiful and inspiring an example of them.

But qualities still more rare than that here alluded to characterized the pursuits and conversation of our late colleague. No one could fail to remark his singular freedom from the ambitious impulses which, while they stimulate the labors of men of science, so often dim the clear beauty of their aspirations for what is true and beneficent. With him the love of knowledge, as gathered in the fields and in his precious library and herbarium, was a sufficing incentive and adequate reward. Delighting to store his mind with the beautiful truths gathered from the ample sources around him, and ever ready to help others devoting themselves to kindred branches of inquiry, and indeed to any scientific pursuits, his *singular modesty* shrunk from the least public exhibition of his various knowledge, and, in the eyes of those who knew his solid and diversified culture, gave to his social character its most peculiar and winning charm.

Such were some of the services and characteristics of our late colleague, for which we owe him the tribute of our respect and reverence: and in testimony of which Professor Rogers concluded by submitting the following resolutions: —

1. *Resolved*, That while it is the duty of the Society to hold in grateful recollection all who at any time may have participated in its labors or helped to enlarge its means of scientific usefulness, it is under especial obligations to honor the memory of the founders and early patrons of the Society, whose earnest zeal gave the first strong impulse to the pursuit of Natural History in this community, and whose liberal contributions and fostering care laid the foundation for those labors which have won for the Society an honorable place in the history of scientific investigation.

2. *Resolved*, That the Society, while deeply regretting the loss which it has sustained in the death of its late associate, Dr. Benjamin D. Greene, has a sad pleasure in placing on record an expression of its grateful and enduring reverence for his memory as one of the most zealous of its founders, as its first acting President, and as one of the most liberal of the patrons and co-workers of the Society.

3. *Resolved*, That in expressing our sense of the great value of the services of our late associate to this Society, and of his worth as a cultivator and promoter of Natural Science, we would dwell with affectionate interest on the gentle graces of character for which he was remarkable, and especially on the shrinking modesty and reserve which veiled so beautifully the knowledge and culture they were unable to conceal.

4. *Resolved*, That the Secretary be directed to transmit a copy of these resolutions to the family of the deceased.

The resolutions were unanimously adopted.

On motion of Dr. Gould, it was voted, —

That a Memorial of his Life would have an important influence on the interests of Science; and that Rev. R. C. Waterston be requested to prepare such a Memorial, with a view to its publication under the auspices of the Society, if agreeable to his family.

Professor Rogers read a letter from Joshua Bates, Esq., of London, presenting to the Society a cast of the Megatherium in the British Museum. The thanks of the Society were voted for this valuable donation.

Mr. W. G. Binney exhibited a map of North America north of the Rio Grande, illustrative of the distribution of the Land Shells, and made the following remarks thereon: —

As regards the geographical distribution of the terrestrial Mollusks of North America, judging from the very limited material at our disposal, there appear to be three distinct Provinces, which are again subdivided into Regions. These are shown in the following table: —

I. The Pacific Province, comprising a narrow strip between the Sierra Nevada and the Pacific Ocean, extending through all of our Pacific States.

II. The Central Province, extending from the Sierra Nevada to the most eastern range of the Rocky Mountains and thence to the Rio Grande.

III. The Eastern Province, comprising the remaining portions of the continent, and subdivided into, —

(*a.*) *The Northern Region*, bounded on the south by a very irregular line, apparently commencing at the Atlantic Ocean, running along Chesapeake Bay and the Potomac River to the Alleghanies, then along that chain north-easterly to Lake Champlain, thence south-westerly through the chain of great lakes, then westerly to the mountains. Its western boundaries are unknown north of 50°.

(*b.*) *The Interior Region*, stretching from the last-named to the alluvial regions of the Atlantic and Gulf, and bounded westerly by the Rocky Mountains. It includes also within its borders the distinct subregion of the Cumberland tableland.

(*c.*) *The Southern Region*, comprising the whole alluvial region to the Rio Grande, and including two very distinct subregions, the Texan and Floridan.

The number of species found in these several Provinces and Regions, the number of individuals in each, and many other interesting questions, will form the subject of a future paper.

Professor Agassiz alluded to a remarkable feature in the distribution of the fresh-water fishes of Europe: that the fishes of the head-waters of the three great rivers, the Rhine, the Rhone, and the Danube, were the same, while those the lower waters differed not only from one another, but also from those of the sources.

Mr. F. W. Putnam remarked that the fresh-water fishes of North America were generally more limited in their distribution than the mollusks mentioned by Mr. Binney, although there were several species that extended over the whole region from Texas north to the Saskatchawan, and east to the Atlantic. *Perca flavescens*, *Pomotis vulgaris*, and *Boleosoma Olmstedii*, are examples. The more limited districts or faunæ, within this region are, 1st, The waters of the Upper Mississippi and Missouri; 2d, the Arkansas and its tributaries; 3d, the Lower Mississippi and south-west to the Rio Grande; 4th, the waters of the Southern Atlantic States; 5th, the Ohio and its tributaries; 6th, the Northern Atlantic States; 7th, the Great Lakes, including, in all probability, Lake Champlain and some of the larger lakes in Maine.

Mr. Putnam was led to the supposition of there being a "Great-Lake" fauna from the study of the *Catostomi* and *Cyprini*, having carefully compared specimens of several species from Lake Richardson and Lake Champlain with those of Lake Superior, and found them identical.

Of the fishes of the Pacific slope of the Rocky Mountains he could say but little, except that so far as he knew they were specifically distinct from those of the Atlantic slope.

With the exception of a well-marked Arctic fauna, the fishes north of the States are not sufficiently known to warrant any conclusions.

Mr. S. H. Scudder, in referring to Mr. Binney's remarks, said that the study of the geographical distribution of insects in America did not prove the boreal portions to be one indivisible province, but that different species were found to inhabit the extremes and the centre of the district. He alluded further to the European character of the Lepidopteran fauna of California, where, in antagonism to the other portions of America, there were found to be a great abundance of *Lycænidæ*, and an almost total absence of *Teriades*.

Professor Agassiz observed, from the dissimilarity of results arrived at in the different groups, that too much confidence should not be placed in conclusions obtained from a study of a single group only.

Dr. O. W. Holmes exhibited a microscope-stand for which he claimed certain advantages, and which he employs in his demonstrations: —

The base is of black walnut, supporting an upright flat portion of the same wood, with two crotches in which the somewhat heavily-loaded tube rests, inclined at an angle of thirty degrees from the horizontal. The adjustment is by rotation of the large shade disc, a pin projecting from which rests against the slightly-inclined extremity of the upright support, and is according to the general plan long employed by him. The stage is of iron, eight inches long, and rests against the flat ends of a horse-shoe magnet. It turns on an edge a little to the left (or right, if preferred) of the middle, so that the up and down motion is a radial one, while the lateral motion is sliding. An achromatic condenser and diaphragm of the simplest construction are brought close to the stage. The direct light of a kerosene lamp, which is brought as near as possible to the achromatic condenser, is preferred for illumination. When daylight is used the following is the arrangement: A plano-convex lens is mounted in a deep, open frame, and may be thus used as a magnifier or a bull's-eye. When a reflector is wanted, two round pieces of plane mirror, fastened back to back, are placed in the frame, so that one of them shall lie against the plane side of the lens. This contrivance gives us a plane mirror on one side, and a combination practically equivalent to a concave mirror on the other. The instrument is so arranged as to be very easily packed and handled. Dr. Holmes claims that it is perfectly solid, simple in management, gives a brilliant and readily adjusted illumination, especially with artificial light, has no machinery which can get out of order, and can be constructed very cheaply. The idea of the magnetic stage is not original, but the arrangement of it is new, embodying the radial movement first used, he believes, by himself, in a microscopic stage. He has for some years used instruments of his contrivance resembling this in many points, with satisfaction, but presents this model as more simple than and as effective as those he has previously employed. It is specially adapted for the higher magnifying powers.

November 19, 1862.

The President in the chair.

Mr. A. E. Verrill presented a paper entitled, "Review of the Polyps of the Eastern Coast of the United States, with descriptions of new and imperfectly known species."

Dr. J. Wyman gave an account of recent observations on *Penta-*

stoma (Linguatula, Rudolphi) armillata, Wyman, which infests the lungs of the *Python Sebæ*, of Africa. This species of Entozoon was first described in the Journal of the Boston Society of Natural History, Vol. v., p. 294. To the description there given, the following particulars are added : —

The number of individuals found in the lungs of the specimen of Python here noticed was six, all but one of which were females, and the longest measuring six inches in length. The form of the females is cylindrical, somewhat flattened on the under side, and gradually diminishing from the middle backwards. The tegumentary rings are large, prominent, and fleshy, widely separated, and placed a little obliquely on the body ; eighteen of them are well defined ; four more are contained in the head, and scarcely to be distinguished from each other. The hooks, four in number, are arranged in a curved line which is concave upwards, the mouth being in the middle of the line ; and above it, on the foremost part of the head, are two prominent papillæ, slightly separated from each other. The muscular system consists of bands of longitudinal fibres, separated by narrow intervals, except on the middle line beneath, where there is a wide space without such fibres, and through which the viscera are easily seen. The genital orifice is in front of the anal.

The *male* was much smaller, only 1.84 inch in length, of an elongated conical shape, regularly tapering to a point from the head backwards. There are only fourteen distinct fleshy rings, and four more in the head but imperfectly defined. Besides the two papillæ on the top of the head, as seen in the female, there are two others on each side, one over each of the hooks.

Van Beneden, in his description* of *P. proboscidea*, describes the testis as being *beneath* the intestine ; — in *P. armillata* both ovary and testis are *above*, or on the dorsal side of, the intestine. In the female the spermatheca is of a spherical shape, instead of being cylindrical, and ending in an oval pouch as in *P. proboscidea.* Van Beneden has given the embryology of this genus, and shown its affinities with the Lerneans.

Mr. A. Agassiz exhibited drawings of a new genus of *Physophoræ.* It is closely allied to *Halistemma* Huxl. and *Agalmopsis* Sars. The swimming bells are arranged in two rows ; in the largest perfect specimens found there were not more than four on each side ; they resemble those of Agalmopsis. The tentacles are of three kinds — clusters of long, slender threads, which they throw about in every possible direction, having club-shaped appendages without filiform terminations ; the second kind are clusters of short, corkscrew-shaped

* Mem. Acad. Roy. des Sc. Belges, T. xv. p. 188.

tentacles, covered with a pavement of lasso-cells for their whole length, as in the club of the long tentacles ; and the third kind of tentacle, which is always found at the base of the Hydrocysts, as Huxley calls them, are perfectly simple, thread-like appendages, with an occasional cluster of lasso-cells like small warts. From the observations Mr. Agassiz had made about the development of this genus, he was inclined to believe that the Hydrocysts became separated, — that a float was formed at the extremity which was formerly attached. Below this float, swimming bells, deckstücke, tentacles, Hydræ, soon made their appearance, and thus young were formed, precisely in the same way as those which were developed from the eggs. Although he had never seen them separate, yet he had frequently found Hydrocysts still attached with strong constrictions at the base, in which an oil bubble had become separated into a distinct cavity by the folding of the walls. These Hydrocysts, thus attached, could in no way be distinguished from young specimens which were found floating about, and which afterwards developed in confinement to adult specimens. Hence strong probability that by the separation of these Hydrocysts we have in Physophoridæ a mode of development similar to the budding of some genera of Hydroids, in addition to the development by sexual reproduction. In jars in which adult specimens had been placed these Hydrocysts were frequently found after they had separated. On account of their small size they may however have escaped notice at first, and been introduced with the adults. This species is quite small, never growing to more than two or three inches. Specimens of that size had the reproductive organs quite well developed. This species appears to be nocturnal, as not a single specimen was ever taken during the daytime : scarcely a night passed while fishing for them without finding several. He would propose for this species the name of *Nanomia cara*. It is found at Nahant during the summer and fall. This is the first free Hydroid found north of Cape Cod, and, if we except the occasional washing ashore on the Cape of specimens of *Physalia arethusa* Til., brought by the gulf stream, the only species known to inhabit the coast of New England. A more detailed account of this interesting Hydroid, with figures and its embryology, will shortly be published.

On motion of Dr. A. A. Gould it was voted that the names of all persons who have contributed toward the erection of the new building the sum of one hundred dollars and upwards, be entered on the Records of the Society as Patrons.

Mr. Thomas MacFarlane, of Acton Vale, C. E., was elected Corresponding Member.

Mr. George H. Powers, of Boston, and Messrs. J. A. Allen and W. H. Niles, of Cambridge, were elected Resident Members.

December 3, 1862.

The President in the chair.

Dr. Pickering referred to two *Esquimaux* now on exhibition in this city. From their low stature, florid complexion, broad, flat countenance, with the profile very slightly projecting, one would be disposed to reject the idea of affinity with the general aboriginal population of this continent. But the sea-going tribes of Northwest America, of which he had seen the Chinooks, are intermediate in aspect; having very generally a lighter complexion, and less prominence of profile, than the interior or hunting tribes. He had remarked, that the strange custom among the Chinooks of flattening the skull produced "unusual breadth of face;" and he now thought that the purpose aimed at may have been the Esquimaux standard of personal beauty. In addition to his published opinion that, with one minor exception, America was originally peopled from the Northwest by the sea-going tribes following the coast, personal inspection now satisfied him that the Esquimaux are Mongolians, and that there is no distinct physical race of man in the Arctic regions.

Mr. S. H. Scudder gave an account of the structure of *Pogonia ophioglossoides* Nutt., and of the probable manner in which its fertilization is effected: —

The plant is of special interest, since it belongs to the only group of Orchids of which Darwin in his recent work has given no account. The flower is thrust out at nearly right angles to the upright stem, the column being a little raised from the horizontal; the labellum is spatulate, heavily crested and fringed, the distal half depending somewhat; the shield-shaped, stigmatic surface is situated at the upper front portion of the column, which is surmounted by a pretty deep clinandrum, with an elevated, jagged border; and to the hind part of this, the curiously shaped, auriculated anther is attached as a lid by a narrow, elastic hinge, which compels the anther-lid to remain deeply seated in the clinandrum, whose thin, jagged edges border it on every side. Upon the under surface of the anther-lid, as it thus lies, are situated the two bunches of pollen, confluent, forming a prominent oval mass; they are not pollinia, that is, they have no caudicle and disc, but are only pollen-masses, completely sessile, which a slight touch may remove. The thin edges of the clinandrum do not border the anther-lid equally on every side, for if it were so the raising of the lid would brush the prominent pollen-masses against the front edge, causing the pollen to fall useless into the bottom of the pit, and thus render the plant self-destructive; to obviate this, the edge of the clinandrum in front is hollowed and thrust forward slightly, leaving sufficient room for the passage of the pollen-masses at the raising of the lid; the resulting space is not, however, left completely open, but, as if to prevent the accidental removal of the pollen-masses, the lower front edge of the anther-lid is furnished with a row or fringe of elongated papillæ, quite effectually closing the opening. So by this means, although the masses of pollen and the stigmatic surface are in close contiguity, they are entirely prevented by the exact structure and sculpture of the parts of the flower from ever coming in contact with one another except through foreign aid; for the pollen-masses are seen to be completely packed away in a deep pit, pressed down by a ponderous lid, whose elastic hinge will not allow its elevation without considerable force: and should by any possibility a portion of the pollen escape through the opening in front, really effectually closed by the fringe, it would drop, not upon the stigmatic surface, but upon the labellum, opposite to it.

By what means does an insect effect the fertilization of this plant? Its probable action may be readily and successfully imitated. Flying to the flower intent upon its sweets, it would alight upon the labellum, and, creeping in, would strike its head and back first against the protruding anther-lid, only pressing it down more tightly, effecting nothing, and then against the stigmatic surface. The passage into the flower is narrow, allowing no room for anything but a very small insect to turn round in, so that no sooner does the insect withdraw itself backward, than the top of the back and of the head striking, as it almost infallibly must, against the front of the anther-lid (which at its upper portion projects forward somewhat, in order the more readily to catch the passing head), raises it more and more with its continued withdrawal, rolling the outer and under surface of the lid against the upper and front portion of the head of the insect, till it has passed, when the lid snaps back to its original position, leaving the pollen-masses adhering to the upper portion of the front of the insect's head; — or if only a portion of the pollen be removed, the lid, being closed again, is ready for the services of the next visitor. The insect flies to another flower, and, striking with the top of the head plump against the viscid stigmatic surface, leaves the pollen glued to it, and thus fertilization is ensured.

There are several minor points of structure in the plant, all seeming to aid in this special mode of fertilization through the agency of insects. The prominence of the front of the anther-lid has already been referred to; besides this, the fringe upon the under edge of the lid in front is directed slightly outward, and may assist by becoming entangled or interlocked in the hairs of the retreating insect, and more surely effect the raising of the lid; the edges of the column on either side of the stigmatic surface project outward a little, making a shallow channel for the better guidance of the insect toward it; and it does not seem too fanciful to suppose that the heavy beard upon the labellum, through which the insect must pass with difficulty, may cause it to walk through it as it were on tiptoe, in order to raise its abdomen high above the obstacle, and therefore to strike more surely the stigmatic surface on entering and the anther-lid on retiring. There is besides another curious fact: on raising the lid, it will be seen that it does not open altogether as we should expect it, but is thrust forward a little, apparently through some elasticity of the hinge, so that the pollen-masses, when the lid is partially open, are found to reach a position nearly as far forward as the projecting front of the lid did when closed, although on the removal of the pressure it will revert to its original position; this again seems to lend its aid in the same direction.

Out of nine flowers examined on the first of August at the White Mountains, N. H., seven had both pollen-masses and stigmatic surface intact; the other two had each their stigmatic surface smeared with pollen, and the pollen-masses, in one wholly, in the other partially, removed. The plant very generally has but a single flower, so that, by what has been stated, it will be seen that, with rare exceptions, no plant is ever fertilized by its own pollen. It is stated by Prof. Gray in his Manual of Botany that the *Arethusiæ*, to which group *Pogonia* belongs, all have the fertile anther like a lid over the column, and that this lid after a time is deciduous; it may be questioned on this account whether it might not here prove to be directly capable of self-fertilization; but in one of the plants examined, in which the pollinia had been removed, the stigmatic surface smeared with pollen, and the petals of the flower quite withered, the lid still remained, and no loss of elasticity in the hinge was noticed, so that the anther probably does not fall off till a period subsequent to the fertilization of the plant. In another plant not yet showing any signs of decay, where the pollen had been partially removed, that which remained was much discolored, and even seemed to show signs of decay, as if but a temporary exposure to the atmosphere were injurious to it.

This Orchid agrees more nearly with *Dendrobium chrysanthum* than with any other mentioned by Darwin, but differs peculiarly from that in altogether wanting a rostellum,* a second of the characteristic features shared by most Orchids which is wanting in this plant, the pollinia being the first. By noticing the peculiar action of the anther-lid in *Dendrobium*, resulting mainly from the remarkable elasticity of the hinge of the lid (or filament of the anther), we may understand better the structure of the same parts in *Pogonia*, and shall discover in the slight projection of its opening anther-lid that which, attaining its development in *Dendrobium*, forms so remarkable and important a feature in its economy.

Mr. Scudder also stated that he had noticed in the middle of the previous month the operations of the minute *Platygaster*, which attacks the eggs of the canker-worm moth, *Anisopteryx vernata* Harr. After moving round a long while in search of a suitable place to lay its eggs, using its ovipositor as a sort of feeler, the abdomen is plunged down into the space between three contiguous eggs, and the ovipositor perforates the side of one of them, out of view. The body of the insect assumes a position perpendicular to their exposed surfaces, supported in the rear by the wings, which, folded over the back, are placed against the surface behind, while the hind-legs, spread widely apart, sustain the insect on either side, and the middle pair are placed nearer together in the front; with the fore-legs dangling it remains motionless, with the exception of a slight movement of the antennæ, for some three or four minutes, after which it moves off, seldom flying, in search of another place. They were very abundant, eight or ten specimens being frequently seen upon a single bunch of eggs. This parasite was first observed by the late Mr. E. C. Herrick, of New Haven.

Prof. J. Wyman described some of the phases of development in the exterior of the human body, and pointed out some of the resemblances between the limbs of the human embryo and the permanent condition of the limbs of the lower animals. In some human embryos about an inch in length, recently examined by him, he found that the great toe was shorter than the others, and, instead of being parallel to them, projected at an angle from the side of the foot, thus corresponding with the permanent condition of this part in the quadrumana.

Mr. George D. Smith was elected Resident Member.

* It would be interesting in this connection to know whether, as in *Cypripedium*, the stigmatic surface is trifid, or, as in *Cephalanthera grandiflora*, it is bifid; the importance of the knowledge of this fact was not recognized when the examination of the fresh flowers was made.

December 17, 1862.

The President in the chair.

Mr. A. Agassiz gave an account of the changes in size of the yolk in the eggs of starfishes before segmentation commences.

Dr. J. Wyman stated that since the last meeting he had been able, through the kindness of Prof. Agassiz, to examine another specimen of Python Sebæ, and had found a single individual each of the male and female *Pentastoma* in the lungs.

He also stated that soon after a recent snow-storm, while the ground was entirely covered, he had made some microscopic examinations of the dust of the outer air, collected on plates of glass covered with glycerine. In addition to particles of mineral dust, probably that of coal ashes and of soot, he had detected spores of cryptogams, starch granules and pollen. Fragments of coniferous and other woods were also found. The objects most unexpected at this season of the year were the grains of pollen. It was suggested whether these might not have been derived from the trees, where they may have been lodged in the crevices of the bark, or other irregularities of the surface, and from time to time detached by the wind.

The Librarian called attention to the very valuable series of works upon Fungi recently purchased from the Library of Mr. C. J. Sprague.

The following persons were elected Resident Members:— Messrs. T. B. Wales, N. C. Munson, N. A. Thompson, S. P. Ruggles, Samuel Johnson, Jr., Joshua Stetson, John Simmons, Nathaniel Cummings, C. Berkley Johnson, Charles C. Little, Augustus Flagg, N. B. Gibbs, J. D. Bates, E. Dale, Benjamin S. Rotch, J. C. Cooper, Amos A. Lawrence.

DONATIONS TO THE MUSEUM.

Nov. 5. Cast of the *Megatherium* in the British Museum, by Joshua Bates, Esq. A small box of Insects from Beaufort, N. C.; nest of a *Pelopæus;* specimens of fossil coral; shell-conglomerate from Newbern, N. C.; a shell of *Glyptemys insculpta* from Littleton, Mass., by Dr. S. Kneeland; a specimen of *Aluterus* from the coast of North Carolina, by Dr. J Curtis.

Dec. 3. *Didelphis* from South America, by Dr. C. F. Winslow; *Anobium* in safflower from Brazil, by Mr. Chas. A. Andrews.

Dec. 17. Portions of the skeleton of a Porpoise from the coast of North Carolina, by Dr. S. Kneeland.

BOOKS RECEIVED DURING THE QUARTER ENDING DEC. 31, 1862.

Der Typische Frühsommer-Katarrh oder das sogenannte Heufieber, Heu-Asthma. Von Philipp Phoebus. 12mo. Giessen, 1862. *From the Author.*

On the extraction of Cobalt Oxide. By Thomas Macfarlane. 8vo. Pamph. *From the Author.*

Der Schweizerischen Universität Basel bringt zur feier Ihres Vierhundertjährigen Jubiläums die J. M. Universität zu Würtzburg ihre Besten. Gluckwunsche dar durch ihren vertreter A. Kölliker. 4to. Pamph. 1860. Leipzig. *From the Author.*

Bidrag til Kundskal om det aabne Havs Snyltekrebs og Lernæer samt om nogle andre nye eller hidtil kun ufuldstændigt kjendte Parasitiske Copepoder af J. Jap. Sm. Steenstrup og Chr. Fred. Lutken. 4to. Kjobenhavn, 1861. Pamph. *From C. F. Lutken.*

Materials for a Monograph of the North American Orthoptera. By Samuel H. Scudder. 8vo. Pamph. Cambridge, 1862. *From the Author.*

On the Footprints of Limulus. By J. W. Dawson, LL. D. 8vo. Pamph. *From the Author.*

Uber das Wanken der Locomotiven. Von Dr. G. Zeuner. 4to. Pamph. Zurich, 1861. *From the Author.*

Descriptions of New Species of Fossils. By Prof. James Hall. 8vo. Pamph. Albany, 1861-2. *From the Author.*

Description of a new Genus (Trypanostoma) of the Melanidæ, and of forty-five new Species. Description of ten new Species of Unionidæ of the U S. Description of two new Species of Exotic Uniones and one Monocondylæa. Description of a new Genus (Goniobasis) of Melanidæ, and eighty-two Species. Description of eleven new Species of Melanidæ of the U. S. By Isaac Lea, LL.D. 8vo. Pamph. Philadelphia, 1862. *From the Author.*

Treatise on Turpentine Farming. By G. W. Perry. 12mo. Newbern, N. C., 1859. *From Dr. S. Kneeland.*

On the Saliferous Rocks and Salt Springs of Michigan. By Alexander Winchell. 8vo. Pamph.

Descriptions of Fossils from the Marshall and Huron Groups of Michigan. By Alexander Winchell. 8vo. Pamph. 1862. *From the Author.*

Memorial Volume of the First Fifty Years of the American Board of Commissioners for Foreign Missions. 8vo. Boston, 1862.

Miscellaneous pamphlets relating to the Missions. *From the Secretaries of the A. B. C. F. M.*

Der Zoologische Garten. Nos. 1-6. 8vo. Pamph. 1862. Frankfurt, A. M.

Archiv für Naturgeschichte. Nos. 5, 6. 1861. No. 1. 1862.

Elfter Jahresbericht der Naturhistorischen Gesellschaft zu Hannover. 4to. Pamph.

Sitzungsberichte der K. Akademie der Wissenchaften. Band 45. Zweite Abtheilung. Heft 1-4. Band 45. Erste Abtheilung. Heft 1, 2. 8vo. Wien, 1862.

Neunter Bericht der Oberhessischen Gesellschaft für Natur-und Heilkunde. 8vo. Pamph. Giessen, 1862.

Memoirs of Geological Survey of India. Palæontologia Indica. By Thomas Oldham, LD. D. 4to. Calcutta, 1861.

Memoirs of Literary and Philosophical Society of Manchester (England). Vol. I. 8vo. 1862. Vol. II., pp. 1-268. Also Rules of the Society. 8vo. Pamph. 1861.

Proceedings of the Royal Geographical Society of London. Vol. VI., Nos. 2, 4. 8vo. Pamph. 1862.

Transactions of the Literary and Historical Society of Quebec. Vol. IV. Appendix. Vol. V., No. 1. 8vo. Pamph.

Canadian Naturalist and Geologist. Vol. VII., No. 5. 8vo. Montreal, 1862.

Canadian Journal of Industry, Science and Art. Nos. 41, 42, Sept. Nov., 1862.

Annual Report of Board of Regents of the Smithsonian Institution for 1861. 8vo. Washington.

Forty-fourth Annual Report of the Trustees of the New York State Library. 8vo. Pamph. Albany, 1862.

Silliman's American Journal of Science and Arts. No. 102, for Nov., 1862.

Transactions of the American Philosophical Society. Vol. XII. Parts 1, 2. 4to. Philadelphia, 1862.

Proceedings of the American Academy of Arts and Sciences. Vol. V. 8vo. Boston, 1862.

Journal of the Academy of Natural Sciences of Philadelphia. Vol. V. Part 2. 4to.

Proceedings of the Academy of Natural Sciences of Philadelphia. Nos. 7, 8, 9, July-Sept., 1862; also No. 9, Sept. 1862.

Proceedings of the Essex Institute. Vol. II., pp. 353 to end of vol. Salem, 1862.

Proceedings of the Entomological Society of Philadelphia for Aug. and Sept., 1862. *By exchange.*

Annals and Magazine of Natural History. Nos. 58-60, for Oct.-Dec., 1862. 8vo. London.

Quarterly Journal of Geological Society. No. 72, for Nov., 1862. 8vo. London. *From Courtis Fund.*

Among the Pines; or, Life in Secession Time. By Edm. Kirke. 12mo. New York, 1862.

America before Europe. By Count Agénor de Gasparin. 12mo. New York, 1862.

Life and Letters of Washington Irving. By Pierre W. Irving. Vol. II. 12mo. New York, 1862.

History of Friedrich the Second, called Frederick the Great. Vol. III. By Thomas Carlyle. 12mo. New York, 1862.

History of Greece. By Geo. Grote, Esq. 12 vols. 12mo. New York, 1861. *Deposited by the Republican Institution.*

January 7, 1863.

The President in the chair.

Dr. Wm. Stimpson presented a paper entitled, "Monograph of the Genus Callinectes, by Albert Ordway."

Prof. H. J. Clark read a paper under the title, "Prodromus of the History, Structure and Physiology of the order Lucernariæ."

Mr. S. H. Scudder made a few remarks on the history of the parasite (*Ophion cecropiæ* Harr.) which attacks the Hyalophora cecropia

Dunc. Opening cocoons of this moth, whose larva had been attacked by the Hymenopteron, the cocoon of the Ophion is seen within the innermost cocoon of the moth, with the dried larva-skin of the Saturnian shrivelled up and fitting closely to one end of the cocoon, just as in uninjured specimens it lies against the extremity of the abdomen of the pupa. The larva of Hyalophora, with the parasite within it, must then live until after it had made both of its cocoons, and die before changing to a pupa; the larva of the Ophion at this time must be prepared for its transformation, and, making its cocoon within the larva, transforms to a pupa; the Saturnian larva dies, — a mere pellicle expanded over the enclosed cocoon of the Ichneumon; the skin dries, contracts, splits at the usual place, and shrinking, just as it would have done in its normal condition, over the enclosed pupa, is gathered into a cup-shaped parcel at the end of the cocoon.

Capt. N. E. Atwood, of Provincetown, Mass., gave an account of the changes the fisheries of our coast had undergone, and of the variable habits of many species of fish. Early accounts state that up to 1764 blue-fish (*Temnodon saltator* Cuv.) were very common north of Cape Cod, after which date they disappeared. Having had an experience of forty years in connection with the fisheries, he could say that none had been seen north of Cape Cod until twenty-five years ago, when he saw his first blue-fish. Those found at that time were invariably small, the largest weighing about two pounds. In 1839 they were caught off Nantucket weighing eight to ten pounds; in two or three years more those coming north of Cape Cod were larger, and drove away the mackerel and smaller fishes, and completely filled Provincetown harbor. They are found now in great abundance. They make their appearance in June, coming into the harbors all at once, and driving away the mackerel entirely. On one occasion they came on the 22d of June; the day previous 8,000 mackerel were caught in the harbor; on the 22d not one was to be found. They leave the coast with the appearance of the first cold northeast storm, about the last of September, though two or three individuals were taken in Provincetown last December. They have only recently come into the market, for seven years ago scarcely any were sold; but during the past season he alone had brought to the market 45,000 pounds weight. Since their great increase, the lobsters (*Homarus americanus* Dekay) had multiplied four-fold, for the natural enemies of their young had been driven away by the blue-fish. Formerly these fish appeared in large shoals near the surface, constantly "flouncing out" of the water, and they were caught in sweep seines and by the hook; now, though they come in large quantities, they seem to prefer the deeper waters. This year he had not seen a dozen "flounce out" as formerly, nor can they be taken, as then, with the hook. Another mode of catching them formerly was by the setting of weirs off the shore, for they swam along the shore, and very many were thus captured; but that method had failed, for now they seem to pass just outside of the weirs. The present mode of fishing is by "gilling" them, as follows: two boats, each with 450 yards of nets, after uniting their ends, start from a common point away from one another, in opposing semicircles, so as to enclose the fishes seen; but, just before reaching one another, they turn inwards, each towards the net they have laid, turning round more and more in a helicoid curve till the end is reached; a position being then taken at the open space, by the splashing of oars the fishes are frightened away directly into the meshes of the net.

Mackerel (*Scomber vernalis* Mitch.) also had changed their habits much. The former method used in catching them was by dragging hooks on lines twenty fathoms long, and constantly raising and lowering them; now they are caught at the surface with bait, large quantities of it being strewn alongside to attract them. The bait used is generally the poorer mackerel, ground up. The former method of obtaining them has now entirely failed.

The Cod (*Morrhua americana*) upon the Banks of Newfoundland seem also to have changed their habits. Formerly, all the fish were caught on board of the vessels while lying at anchor. The vessels take a crew of eight men, each using two lines; when the fish were abundant, all the men would fish, but usually not more than half the crew; at times, when no fish could be taken, all the lines but one would be drawn in, and then they would begin to be taken abundantly; but let two or more men begin to drop their lines, and not an individual would be taken; while, should all the lines but one be again taken in, the captures would once more be frequent. This suggested the idea of carrying small boats with them, so that each man could fish apart from the others, and in this they met with perfect success; and, generally, when all the fishermen in the boats would catch them plentifully, few or none could be taken from on board the vessel. Capt. Atwood thought that the cause was the different motion of the small boats from the vessel, as there is constantly an agitation of the waves upon the Banks.

The following letters, recently received, were read by the Secretary, viz.:—

From the American Philosophical Society, February 6th, October 3d, November 8th, 1862; and the Real Academia de Ciencias, Madrid, Dec. 11, 1862, acknowledging the receipt of the Society's publications; from the Oberhessische Gesellschaft, Giessen, June 1st, 1862, acknowledging the same, and presenting its own. From the Literary and Philosophical Society of Manchester, presenting its Memoirs, 3d Series, Vol. I., Proceedings, Vol. II., and Rules of the Society. From the Natural History Society of New Brunswick, St. John, October 22d, 1862, desiring an interchange of publications, and presenting a copy of its Regulations and By-Laws; the Entomological Society, London, November 19th, 1862, offering its publications to the Society. From Mrs. Margaret M. Q. Greene, Boston, November 22d, 1862, in response to a letter communicating the resolutions adopted by the Society on the occasion of the decease of the late Dr. B. D. Greene; and from Edward D. Cope, Esq., Philadelphia, Dec. 19th, 1862, in acknowledgment of his election as Corresponding Member.

Messrs. Geo. H. Richards, Francis Gorham, M. S. Scudder and J. S. Blatchford, were elected Resident Members.

January 21, 1863.

The President in the chair.

Dr. J. C. White was chosen Secretary *pro tempore.*

A paper from Dr. Wm. Stimpson was presented, entitled, "The Fossil Crab of Gay Head."

Prof. Agassiz made a few remarks about the enigmatic fossil which has been lately discovered at Solenhofen; and, after passing in review the opinions of Owen, of Meyer and of Wagner concerning the nature of the animal, he inclined to the belief that this was but an additional case of a synthetic type such as he had at first pointed out among fishes, where there were fishes with reptilian characters. In this case it was a synthetic type of a higher class — a reptile with bird characters.

Mr. A. Agassiz made a few remarks about the geographical distribution of the Sea Urchin of Massachusetts Bay, the Echinus granularis of Say. He said that he had carefully compared it with specimens of the Toxopneustes drobachiensis Ag. of Norway, sent by Prof. Sars to Prof. Agassiz, and had not been able to discover any specific differences. Lütken had pointed out the identity of the Echinus which inhabits the shores of Greenland and the Toxopneustes drobachiensis. Mr. Agassiz had besides occasion to examine the collection of Echini brought home by Mr. Stimpson from the North Pacific Ex. Ex., among which there were specimens of Toxopneustes drobachiensis from Petropaulsky and Behring's Straits. Those he had carefully compared with specimens of the Echinus chlorocentrotus Brandt, which Mr. Agassiz had collected himself at Vancouver's Island, in the Gulf of Georgia, W. T., and was satisfied that the species described by Brandt could not be distinguished from the Toxopneustes drobachiensis Ag. He had also examined specimens of the same species from Hudson's Bay, collected by Mr. Drexler, and from New Jersey, which belonged to the collection of the Smithsonian Institute.

This species of Echinus is, then, without doubt, found on both sides of the Old and New Worlds, and along the whole arctic coast of Asia and North America, descending on the Asiatic side as far south as the southern extremity of Kamtschatka; on the Pacific side of North America as far south as the Gulf of Georgia and the Straits of Fuca; while on the Atlantic side it extends as far south as the coast of New Jersey in America, and the Shetland Islands and the southern extremity of Norway and Sweden in Europe.

But, while admitting this extraordinary range of distribution, Mr. Agassiz remarked that, although he had not been able to perceive any difference in the adults, yet he was not prepared to say that future investigations would not point out permanent differences in the young of specimens from these remote localities. In support of this he brought up the case of the three species of Coryne, one found on the west coast of North America, the other on the eastern coast, and the species from England, the adult free Medusæ of which it was almost impossible to distinguish, while the Hydræ were so distinct that they would not be confounded by the most casual observer. He also mentioned the case of Sarsia and Syndiction, the free Medusæ of which could hardly be distinguished; but yet in their Hydra state, and during the earlier periods of their Medusa state, they were as different as possible in their appearance — in fact belonged to two very well-defined genera. He also made allusion to a paper of Rev. Mr. Hincks in one of the last numbers of the Annals and Magazine of Nat. Hist., who had from similar facts drawn the conclusion that Hydræ belonging to different genera could produce Medusæ belonging to one species. He thought that this conclusion was hardly logical, but simply implied our inability to distinguish adult Medusæ belonging to closely-allied genera in the present state of our knowledge. Mr. Agassiz mentioned also the case of many of the free Medusæ of our Campanularians, which he had at first mistaken for the same species, but which, upon raising from the Hydra, and tracing in all their stages, he could now easily distinguish.

The following are the different localities from which there are specimens of Toxopneustes drobachiensis Ag. in the Museum of Comparative Zoölogy at Cambridge:—

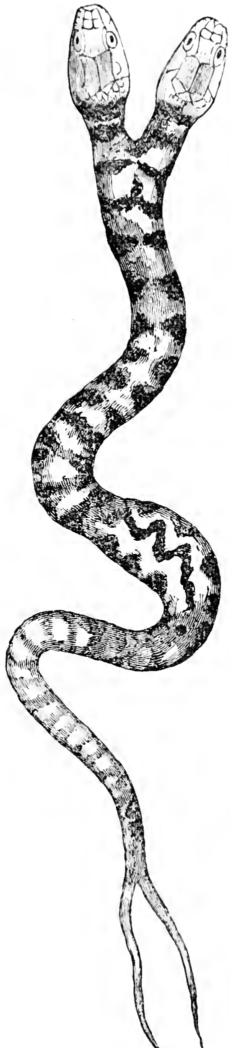
Toxopneustes drobachiensis, Ag. Drobak (*Sars.*) Oresund (*Eschricht*). Behring Straits (*Stimpson*).* Specimens in collection of the Smithsonian Institution. Awatscha Bay (*Stimpson*).* Specimens in collection of the Smithsonian Institution. Gulf of Georgia, W. T. (*A. Agassiz*).* Hudson's Bay (*Drexler*). Specimens in collection of the Smithsonian Institution. Greenland. Labrador (*Dr. J. Wyman*). Nova Scotia (*P. C. Hill*). Newfoundland (*Miss Dix*). Grand Menan (*Stimpson, Mills*).† Coast of Maine (*Verrill, Shaler, Hyatt*).† Massachusetts Bay (*Agassiz*).§ Nantucket (*Agassiz*).‡ New Jersey (*Capt. Gedney, U. S. N.*) Specimens in Smithsonian collection.

Prof. Agassiz announced to the Society that the cast of the Megatherium presented by Mr. Bates had been mounted at the Museum of Comparative Zoölogy. After it was put up he had examined it carefully, and had come to the conclusion that the mode of mounting, which is very nearly that of Owen, was not quite accurate; and that the Megatherium, instead of being set up erect, should have been placed in a crouching attitude, with the hind legs bent, sufficiently so that the tail should touch the ground, — with the head bent down between the front legs, the broad chest resting upon the ground, supported by the fore-legs, extended in such a way that they should rest for nearly their whole length, and leave simply a free play for the extremities to reach out beyond the head. As he understood that the Society were to have a similar cast, he made these suggestions for the benefit of whomsoever should have the charge of mounting the specimen.

Prof. Wyman exhibited drawings of two specimens of monstrosity in serpents. One of these, presented to him by Prof. Agassiz, was of a young *black snake* (*Coluber constrictor*), which had two complete heads united to a single trunk. The vertebral column was double for a short distance behind the head, and over the same region the transverse black bands, usually found in the young of this species, were divided lengthwise.

The second drawing, as seen in the annexed figure, was of a specimen of the *water adder* (*Tropidonotus sipedon*), belonging to the Massachusetts State Collection, and kindly loaned for description by Mr. C. L. Flint, Secretary of the Board of Agriculture. As it is a unique specimen, and a gift to the State collection, a complete dis-

* (*Echinus chlorocentrotus* Br.)
† (*E. granulatus* Stimp.)
‡ (*E. granularis* Say.)
§ (*E. granulatus* Gould.)



section of it was not thought advisable. In this the heads were more widely separated than in the preceding one, each head being supported by a distinct neck. The tail was also double for about an inch. The most remarkable deviation was found near the middle of the body. In this region the size is considerably increased, and the transverse dark bands of the skin are interrupted in the middle, the lateral portions remaining. On the middle line passing between these is a longitudinal zig-zag line, which extends the whole length of the enlarged portion. In this region the vertebral column is double, and provided with a double set of ribs, but is single before and behind it. The doubling of the vertebral column in its central portion in the manner above described is of very rare occurrence, and does not appear to have been noticed in the various works treating of monstrosity.

Monstrosities of serpents in which the head is double have been often noticed. Aristotle mentions such. Redi found one alive sunning himself on the banks of the Arno, near Pisa, which was two palms in length, and as large as the little finger. The heads were of equal size, and each supported by a neck of two fingers breadth in length. Redi preserved it alive for several weeks, and tried experiments with it; he noticed that the right head died seven hours before the left. In this case the brain and spinal mar row were double as far as the middle of the back, beyond which the spinal cord was single. The œsophagus and stomach were double, but the stomachs connected with a single intestine. There were two hearts and two livers, but only one set of genital organs.

References. — *Dumeril and Bibron.* Herpet. Gen. T. vi. p. 210.
Redi. Osservazioni intorno agli Animali Viventi. Firenze, 1684, p. 1.
Lacepede. Œuvres. Paris, 1840. T. ii. p. 309.

Silliman's Journal. Vol. x. p. 48.
St. Hilaire, Isidore Geoffroy. Teratologie. T. III. p. 185.
Hunterian Museum. Catalogue of Monstrosities. Specimens 32 and 33.
Boston Society for Medical Improvement. Catalogue of Museum. Specimen 856.
Bancroft. Natural History of Guiana, with a plate representing a double-headed snake taken near Lake Champlain.

Mr. C. F. Hartt, of Cambridge, was elected Resident Member.

February 4, 1863.

Lemuel Shaw, Esq., in the chair.

The following paper was presented: —

CATALOGUE OF THE REPTILES AND BATRACHIANS FOUND IN THE VICINITY OF NORWAY, OXFORD CO., ME. BY A. E. VERRILL.

The following catalogue is intended to afford some additional data concerning the geographical distribution of our animals; and since we have in Maine, as I have in another place shown,* at least in respect to the birds, two faunæ, — the Canadian, in the northern and eastern parts of the State, and the Alleghanian, in the southern and central, — it is of great importance to ascertain with the utmost care the exact range of all the species, and also their relative abundance at different places. In this list I have endeavored to embody all the facts of this kind ascertained from personal observation, during a residence of several years, concerning the locality, adding in a few instances observations made by others, which are in each case acknowledged.

It is not probable that any additional species will be found, except two or three Salamanders, and possibly another Hylodes; but several other species occur in the south-western part of the State, York and Cumberland Counties, such as the Black Snake (*Bascanion constrictor* B. & G.), Box Turtle (*Cistudo virginea*), and a few more, which do not appear to extend so far northward as Norway.

REPTILIA.

TESTUDINATA.

Chelydra serpentina Schw. Snapping Turtle. Common; living in ponds and muddy streams.

* Proceedings of the Essex Institute, Vol. III., p. 13 March, 1862.

Chrysemys picta Gray. Painted Turtle. Very common; living chiefly in muddy places, and seldom going far from the water. This species is found in all parts of Maine.

Nanemys guttata Agassiz. Rare. I have found but one specimen at Norway; it is more common in the south-western part of the State (York and Cumberland Counties).

Glyptemys insculpta Agassiz. Sculptured Turtle. Common; often found at considerable distances from water. I have found it feeding on the leaves and scapes of Dandelion (*Taraxacum densleonis*). In the eastern part of the State, beyond the Penobscot River, I have not been able to find it in numerous excursions, so that it must, at least, be uncommon there. Prof. Agassiz, however, mentions a specimen from the Little Madawaska River, in northern Maine.

Ophidia.

Chlorosoma vernale B. &. G. (*Liopeltis vernalis* Cope.) Green Snake. Very common; distributed over all parts of the State. I have collected it also at Grand Menan, and Breton Island, Nova Scotia.

Storeria Dekayi Baird & Girard.* Not common.

Storeria occipito-maculata Baird & Girard. "Little Brown Snake." Very common. It lives chiefly under logs and stones, and is somewhat nocturnal in its habits.

Some specimens of this species are reddish brown above, and others slate-colored, — a difference which is, perhaps, sexual. *Celuta amœna*, attributed to Maine by Dr. Fogg,† is unquestionably the red-colored form of the present species, as I have ascertained by an examination of the specimens in the collection of the Portland Natural History Society, labelled by him. The genus *Celuta* may be readily distinguished from *Storeria* by its smooth, glossy scales, and head continuous with the body, while in *Storeria* the scales are carinated, and the head is distinct from the body, the neck being small. The colors of *Celuta amœna* are, however, much like those of *Storeria occipito-maculata*, and on this account they might be confounded; but I believe the whitish spots found on the back of the head of the latter are never found on the former. Therefore *Celuta amœna* should be erased from nominal lists of the reptiles of Maine; and

* The genus *Ischnognathus* was proposed for this species by Duméril and Bibron, in the Memoires de l'Institut de France, XXIII. p. 399, 1853. But since the work of Baird and Girard was published in January of the same year, I have considered their name as having priority; it has moreover the merit of being more euphonic.

† List of the Reptiles and Amphibians of Maine, by B. F. Fogg. Proceedings of the Portland Society of Natural History, Vol. I. p. 86, 1862.

it seems to me quite possible that the single imperfect specimen, mentioned in Dr. Storer's Report on the Reptiles of Massachusetts, was also a *Storeria*, since no other specimens have been found in this State, to my knowledge. It is common from southern New York to South Carolina.

Diadophis punctatus B. & G. Ring-necked Snake. Not very common; less nocturnal in its habits than the last, but usually associated with it.

Lampropeltis triangula Cope. (Ophibolus eximius B. & G.) Milk Snake. Common, but less so than the next.

Tropidonotus Sirtalis Holb. (Eutænia Sirtalis B. & G.) Common Striped Snake. Very common, and found in all parts of the State. The reddish variety (Eutænia parietalis (?) B. & G.) is found about the Umbagog Lakes, and on mountains farther south, as well as in the eastern part of the State, near the coast. For the synonymy of this species,* see a communication by Mr. F. W. Putnam, these Proceedings, Vol. IX., p. 61.

Tropidonotus Saurita Putnam. Ribbon Snake. Common, but almost entirely confined to meadows and low, wet grounds. It takes to the water readily when pursued, and swims rapidly.

Tropidonotus Sipedon Holb. (Nerodia Sipedon B. &. G.) Water Snake. Common; found chiefly about the shores of muddy ponds, and often seen on floating logs, warming itself in the sun.

Crotalus Durissus Linn. Rattle Snake. Rare. This species is found at one locality, in Albany, and also in Raymond, Me.; but I have never detected it east of the Androscoggin River. It seems to be confined to mountains and rocky hills.

BATRACHIA.

ANURA.

Bufo americanus LeC. Common Toad. Abundant, but less so than in Massachusetts. It is also found in the extreme eastern and northern parts of the State, and at Breton Is., N. S., where specimens occur of unusually large size, which agrees with a fact communicated to me by Prof. Agassiz in respect to the European species, which he had observed of extraordinary size in the elevated regions of Switzerland. He has also

* Since my remarks were made upon the "striped snake," I have been able to consult the *tenth edition* of *Linnæus's* "*Systema Naturæ*," and find that he has there described the *Coluber Sirtalis*; therefore the specific name, *Sirtalis*, must be retained instead of *ordinatus*, which does not appear until the twelfth edition, published eight years afterwards. F. W. P.

made a similar observation concerning the batrachians of the northern shore of Lake Superior.* I have likewise been informed by Mr. A. S. Packard, that he obtained a very large specimen of this species at Esquimaux River, near the Straits of Belle Isle, Labrador.

Hyla versicolor LeC. Tree Toad. Not very common.

Hylodes Pickeringii Holb. Piping Tree Toad. Common. Its shrill notes are almost always to be heard near damp woods in summer evenings; later in the season I have often found it in upland woods, among the fallen leaves. It deposits its eggs in the water in April, and is then very abundant and musical, singing earlier than any other species.

Rana Catesbiana Shaw. (Rana pipiens Latr., *not* of Gmelin.) Bull Frog. Very common, and found in all parts of the State. At the Umbagog Lakes, I have found it unusually large and abundant.

Rana clamitans Bosc. (R. fontinalis LeC.) Green Frog. Very common; generally distributed over the State. Prof. S. F. Baird has united *R. fontinalis* of the Northern States with *R. clamitans* of the South, under the latter name; yet their identity may still be questioned by many.

Rana palustris LeC. Pickerel Frog. Common, but less abundant than the next. It utters a prolonged grating note, usually while floating at the surface of the water.

Rana halecina Kalm. Leopard Frog. Very common. This species is found in all parts of the State; and I have also collected it on Breton Island, N. S., and at Gaspé, C. E. It is often seen in fields far from any water.

Rana sylvatica LeC. Wood Frog. Common. Found chiefly in upland woods among damp fallen leaves. In early spring it frequents the water near woods to deposit its eggs; the loud discordant notes are sometimes heard as early as the first of April.

Urodela.

Amblystoma punctatum Baird. Yellow-spotted Salamander. Common; found as far north as the Umbagog Lakes.

Amblystoma porphyriticum. (Salamandra porphyritica Green.) I refer to this species an *Amblystoma* found by Mr. S. I. Smith under a log in damp woods at Norway.† It agrees well with the descriptions of Green and Holbrook, and therefore shows

Lake Superior, page 382.

† There are also specimens of the same species in the Museum of Comparative oölogy, collected at Milan, N. H., by Mr. J. B. Fulsome; therefore it probably has an extensive northern range.

that the suggestion of Professor Baird in regard to its generic affinities was correct. It seems very probable to me that *A. Jeffersonianum* Baird, is identical with this species, the differences depending upon age, sex, or season; but my specimens agree best with the original description by Dr. Green of *S. porphyritica;* the last name has, moreover, precedence in the same work.

Diemictylus miniatus Raf. Symmetrical Salamander. Common; seldom seen abroad, except after showers.

Diemictylus viridescens Raf. "Water Newt," "Evet." Common; lives in muddy pools and streams.

Plethodon cinereus Tsch. Not common; lives under stones and logs, generally with the next.

Plethodon erythronotus Baird. Red-backed Salamander. Very common; found under stones and logs in rocky woods much more abundantly than the last, with which it is often associated. This species is distributed over all parts of the State; and I have also found it on the islands in the Bay of Fundy, Breton Island, N. S., and at Gaspé, C. E. *P. glutinosus* Bd. will probably also occur here.

Desmognathus fusca Baird. Painted Salamander. Frequent. I have found this species in Greenwood, Me., in cold rocky brooks. Mr. S. R. Carter has also collected it at Paris Hill. The young become quite large before losing their gills. The square red spots on the back are not often apparent except in young specimens.

Pseudotriton salmoneus Baird. One specimen, found in a pool of water, — S. I. Smith.

Spelerpes bilineata Baird. Striped-backed Salamander. The only specimen of this species that I have seen from this region was obtained by Mr. S. R. Carter, at Paris Hill, Me.

Mr. Samuel Wells, Jr., exhibited specimens of the wool of the Alpaca, Llama, and Vicuña, recently imported into this country by Capt. S. B. Bissell of the Cyane; and read the following extracts from a letter of Capt. Bissell to Hon. Gideon Welles, Secretary of the Navy, dated on board U S. Ship Cyane, Chincha Islands, Sept. 16, 1862: —

"I have the honor to report that at Pisco I had the great good fortune to purchase (through a friend long resident in Peru) two of those invaluable animals, the Peruvian Vicuña. The exquisite fineness of the fleece of this animal, and its hardy character and admirable adaptation to any of the cold climates of the Middle and

Northern States, the small quantity of food it requires, living as it does in the frozen and mountainous regions of Peru and Bolivia, and thriving equally well in temperate climates, peculiarly fit it for breeding in California, where, from its capacity to go without water for days and weeks, the occasional long droughts of that State will produce no injury.

"I am fully persuaded that crossing the Vicuña with the Merino and Saxon sheep will produce wool far superior to any now in our country or Europe, both in fineness and texture, as the Vicuña's fleece is short and light, the animal being very delicate in form. The exceeding high price of this wool in England — nearly or quite, I am informed, four dollars per pound — richly compensates for the want of weight, four or five pounds being a large fleece.

"I have obtained through the same friend a pair of Llamas, very noble animals, and a pair of Alpacas, equally fine. I intend all these for an experiment in California. They all belong to the same class of animals, and are equally adapted for rearing in similar latitudes.

"The extreme difficulty of getting the Vicuña and Alpaca out of the country, both being strictly prohibited from exportation under a heavy penalty, has hitherto defeated all attempts of private individuals for sending them abroad, except in the instance of Mr. Ledyard, an Englishman, who spent three years in Bolivia in collecting Alpacas, and after almost incredible hardships, dangers, and unparalleled difficulties, and at a very great expense, having them all to transport across the desert of Attacama, a distance of 100 leagues, on the backs of mules, he succeeded in getting three or four hundred on board a ship he had hired upon the coast, and took the greater part of them to Australia in 1857; and a recent report, which I will endeavor to obtain, says the experiment is proving a great success, both in breeding the animals and improving the quality of the wool. He found it impossible to obtain the Vicuña, even under the stimulating influence of the heavy premiums offered by the English Colonial Government. Ten thousand pounds was given him by Sydney, twenty thousand pounds by Melbourne, in consideration of the benefits conferred upon Australia by the introduction of the Alpaca. The Vicuña has never been sent abroad, its wool being worth in England 100 per cent. more than the Alpaca, so much superior is it in quality, as you will perceive by the enclosed samples taken from the animals now on board the 'Cyane.'"

Capt. Bissell then asks the Secretary of the Navy for permission to try his experiment upon the Government lands on Mare Island, in San Pablo Bay, California, where there is a U. S. Navy Yard. Mare Island contains about five hundred acres of excellent pasture land, where the horses, mules and oxen belonging to the Navy Yard are pastured. " The companionship of all these animals forms an essential element in taming and domesticating the Llama, Vicuña, and Alpaca."

This request has been complied with by the Secretary of the Navy.

Mr. A. E. Verrill exhibited specimens of Zircon and Corundum from Greenwood, Me. The latter was a hexagonal crystal, one and three quarter inches in length, and an inch in diameter. It occurred with others of similar and larger size in a micaceous schist. The Zircon is found in small crystals of a brownish red color and brilliant lustre, imbedded in albite. It seems worthy of remark that tin ore (Cassiterite) has now been found at three localities in Oxford Co., Maine, in similar situations; in each case in a vein consisting in great part of albite, passing through granite; and, in two of the localities at least, it is intimately associated with these small crystals of Zircon, both often being seen in the same specimen. At the locality in Greenwood that he had discovered a few years ago, the associated minerals were Zircon, Pyrochlore and Magnetite, all in small crystals like the tin ore itself. At Mt. Mica, in Paris, so well known for its rare minerals, he had found the ore in 1854 in a mass weighing about five pounds, and also in small crystals. Specimens from this locality had already been exhibited to the Society. At this place the principal associated minerals are the red, green, blue and black Tourmalines, Lepidolite in large masses, Mica, Beryl, Amblygonite, Yttrocerite, Brookite and Zircon. Of these the last three have not been before recorded. The Amblygonite was found during the past year by Prof. G. J. Brush, of New Haven. These all occur disseminated through a wide vein of albite and feldspar, with some other more common minerals.

In Hebron, about eight miles from this locality, there is another vein containing nearly the same minerals, except perhaps the last three, which have not yet been noticed; and, in addition, Mispickel.* Tin ore was found here by Prof. Brush in small crystals. These localities will perhaps serve as an indication of the manner in which this ore may occur at other places in New England.

Dr. Stephen Reed, of Pittsfield, and Mr. B. D. Walsh, of Rock Island, Illinois, were elected Corresponding Members.

President Thomas Hill, of Harvard University, Messrs.

* The mineral mentioned in these Proceedings, Vol. VII. p. 423, as probably Native Arsenic from Greenwood, Me., has recently been analyzed by Mr. G. H Emerson, of Cambridge, and found to be a massive variety of Mispickel.

Robert Fletcher, Charles Carruth, Isaac Sweetzer and Reuben S. Denny, were elected Resident Members.

February 18, 1863.

The President in the chair.

Prof. Wm. B. Rogers read a letter from Joshua Bates, Esq., of London, announcing the shipment of the cast of the Megatherium lately presented by him to the Society.

Mr. F. W. Putnam exhibited two species of spider which carry their young on their back. Of one he had captured 185 young individuals with their parent, and a few others had made their escape; of the other there were but 10 or 12 of the young.

Dr. C. T. Jackson gave an outline sketch of the great copper-bearing belt of Canada, and alluded to the importance of the geological labors of Sir William Logan, who has described the various anticlinal and synclinal axes of the strata, which serve as guides in tracing the copper-bearing beds. Most, if not all, the copper ores of Canada are found to be imbedded or interstratified with the rocks, and are of the middle or lower Taconic series.

There are two great classes of mines: First, those in dolomitic limestone; second, those in the nacreous or talco-argillaceous slates. The first consists of large bunches and reticulated veins of copper ore, often giving to the limestone rock the appearance of a breccia of the rock and copper ore. Acton Copper Mine presents the largest of these deposits, and that mine has yielded an enormous amount of rich copper ores, which have all been smelted in the furnaces of this country.

Harvey Hill Mine, in Leeds, is the deepest mine in Canada, the shafts being 180 feet deep. This mine is a "Slate Mine," or presents the copper ores interstratified with the nacreous slate rocks.

The ores at both the Acton and Harvey Hill Mines are of the same kinds, namely, erubescite, mixed in variable proportions with copper glance and yellow copper pyrites; but the variegated copper ore is the most abundant, and is the richest.

Sutton Copper Mines are exactly like those of Harvey Hill, and are in nacreous talco-argillaceous slate rocks, and interlaminated with their strata.

Canada East is very rich in copper, and has also some important gold mines, — those in the Seignieurie Vaudreuil, at the Falls of the

Chaudiere, being the most valuable. The discovery of alluvial gold on the Chaudiere was made many years ago, but the discovery of veins of quartz in places bearing gold nuggets is a very recent discovery, and is due to the French *habitans*, who have for a long time obtained gold from the borders of the Chaudiere and La Famine Rivers by washing the gravel and sand.

The following mines of copper ores have been examined: — 1, Acton; 2, Halifax; 3, Wickham; 4, Durham; 5, Black River; 6, Sutton; 7, Canada; 8, Chaudiere; 9, Prince of Wales; 10, St. Francis; 11, Megantic; 12, Harvey Hill. Some of these mines are sufficiently well proved to warrant the belief that they will become profitable to the owners; others have got to be proved by mining explorations.

These mines stretch along a belt from fifteen to twenty miles wide, extending from near Memphremagog Lake to near Quebec.

Prof. Jeffries Wyman made the following

Observations on the Cranium of a young Gorilla.

Through the kindness of Mr. P. B. Du Chaillu, I have been able to examine the cranium of a Gorilla, younger than any of which a description has thus far been given, and in which only the deciduous incisors and first milk molars were protruded. This has been compared with the cranium of a young Chimpanzée, in which all the milk teeth were developed, and with a second in which only the middle incisors had pierced the gums.

Between the crania of the young Chimpanzée and Gorilla, there is only a trace of those great differences which exist in the adults, especially in the surfaces of the bones to which the muscles of the lower jaw are attached, and on which the characters of the two species so largely depend. Leaving out of view for the present the bones of the face, the cranium of the young Gorilla, here noticed, is of about the same size as that of a Chimpanzée, in which the first set of teeth is complete. The crania of both are well rounded on the borders of the different regions; the sutures and the large cranial bones are of about the same relative size in both. When viewed from above, the zygomatic arches, which are of nearly the same size and strength in both, are in each concealed by the projecting sides of the cranial walls; the slight ridge on the side of the cranium which marks the origin of the temporal muscle has nearly the same relative extent in both as in man, and is in strong contrast with the subsequent position of it in adults, where it reaches nearly to the median line on the top of the head in the Chimpanzée, and to the high parietal and occipital crests in the Gorilla. The coronal region is more flattened in the Gorilla, but the occiput slopes less suddenly backward than in the Chimpanzée. There are no traces in either of the occipital and inter-parietal crests. The superior curved line of the occiput is already well marked in both, while in a child of a corresponding age this line is scarcely seen, showing the feebler attachment of the trapezius in the latter.

In both species, the brain covers the roofs of the orbits, and extends as far forwards as in man, while in the adult apes nearly the whole of the orbit is in front of the anterior margin of the cerebral hemispheres. If the crania of the young Chimpanzée and Gorilla are compared with that of man, they will be found, in their proportions, to resemble that of an adult rather than that of a child. In the head of the latter, during the first dentition, the face is less prominent than the forehead, and the anterior lobes of the brain project beyond the superciliary ridges, instead of barely reaching to them, as in the young apes. In the latter, the forehead is somewhat retreating and the face somewhat projecting. It is probable that in an earlier stage the crania of the Chimpanzée and Gorilla would resemble that of a child much more closely.

The bones of the face of the Gorilla resemble most nearly those of a Chimpanzée somewhat younger, and in which the middle incisors only are protruded. When seen in profile, the outline of the face in both forms an uninterrupted slope from the supra-orbital ridge to the edge of the incisive alveoli. This is well seen in Figs. 6 and 7, Pl. v. of M. Duvernoy's Memoir on the Gorilla.* In the Gorilla this slope remains permanently, but in the Chimpanzée, by the time the first set of teeth is completed, the jaws have become more prominent, so that their outline forms an angle with the upper part of the face, the nasal bones and the ascending portion of the maxillaries retaining their original direction. Not only do the intermaxillaries become more prominent, but the distance from the lower border of the nostrils to the alveolar margin is considerably lengthened, both in consequence of the extension of this last downwards, and of the lower margin of the nostrils upwards.

The anatomical points referred to above, relate to the general configuration of the head. There remain some other details which it is important to notice, because of the bearing of them upon the relative position which these two species hold in the animal series.

1. *Nasal bones.* — These bones, which in man are so characteristic, are, when taken together, a little broader below than above, somewhat transversely contracted at the upper third, and strongly arched forwards. In the Gorilla the contraction just noticed is much greater, so

* Des Caractères Anatomiques des Grands Singes Pseudo-anthropomorphes; Archives du Mus. d'Hist. Nat. VIII., p. 1.

that the bones are divided into a lower portion which is triangular, and an upper which is lozenge-shaped, the two being connected only by a narrow neck. In the Chimpanzée the sides of the bones are nearly parallel; they are no wider at the lower than at the upper portion, and are relatively very narrow. In neither the Gorilla nor the Chimpanzée are these bones arched above the level of the face, though in the former there is a slight ridge on the median line. The nasal bones, as has been observed by Owen, are, as regards their shape, more nearly human in the Gorilla than in the Chimpanzée.

2. *The orbits.* — In the Chimpanzée the orbits are nearly circular, while in the Gorilla they are somewhat quadrangular, in which respect these are more human. But in the proportion in which the different bones enter into the formation of them, the resemblance to man is the most striking in the Chimpanzée. In the lower Quadrumana, the lower and outer walls of the orbits are mostly formed by the extension of the outer and inner orbital edges of the frontal bones downwards, so that the os planum of the ethmoid becomes quite narrow, and is found near the floor of the orbit, and even forms a part of it, and the great wing of the sphenoid is much lessened in size, and is confined to the hindmost part of the orbital cavity. In these respects the Gorilla most strongly resembles the other Quadrumana, and the Chimpanzée makes the nearest approach to man. The Gorilla agrees with other Mammalia in having the sphenoidal fissure round, and the Chimpanzée with man in having it triangular, though in a less degree, and its apex directed upwards and outwards.

3. *Intermaxillaries.* — In man these bones cease to be distinct at so early an embryonic period that their existence as separate pieces cannot be easily demonstrated, and has in fact rarely been observed. In the lower Quadrumana, as well as in Mammalia, generally the intermaxillaries remain distinct through life. In the cranium of the Gorilla here described they are still entirely separate. Duvernoy found them so in a skull in which the milk teeth were complete, and we have found them still ununited with the maxillaries even in a nearly adult specimen belonging to the Boston Society of Natural History. In a young Chimpanzée, with only the middle incisors protruded, the intermaxillary sutures are almost entirely closed, only traces of them being visible on the borders of the nostrils and in the hard palate; and when the first dentition is ended, as appears from four crania in my collection, their consolidation is completed. In the Gorilla the intermaxillaries are prolonged much farther backwards than in the Chimpanzée, so that the suture between them and the palatine process of the maxillaries, instead of being directed transversely to the incisive foramen, as in man and the Chimpanzée, is bent strongly backwards, as in the lower

Quadrumana. In the structure and development of these bones, the Chimpanzée resembles man much more nearly than the Gorilla.

4. *Palate bones.* — The hard palate is more quadrangular and narrowest in the Gorilla; the palate bones are shorter from before backwards, and are emarginated in the middle line; in the Chimpanzée, as in man, these bones have no notch in the middle of the hinder edge, but in the place of it form a slight projection backwards.

5. *Teeth.* — The incisors of the Chimpanzée are relatively the largest, but, being flatter and more chisel-shaped, have a closer likeness to those of man. The canines were not protruded. The outer cusp of the first upper molar is much longer than the inner, forms a nearly equilateral triangle, and has a small conical projection just in front of, as well as behind its base. In the Chimpanzée the outer cusp of the same tooth is scarcely more prominent than the inner, and the whole tooth agrees very nearly in shape with the corresponding one in a child. The first molar below (d m, 1) is remarkable for its conical form, resembling in its bluntness and general structure one of the premolars of a hyæna. It is a little compressed from side to side, has a slight ridge before and behind, and a small tubercle at the base of it. There is an irregular triangular indentation on the inner face of the crown.

In the Chimpanzée, the principal cusp is relatively smaller; occupies only two-thirds of the crown, and on the inner side of it is a second cusp; behind these cusps is a large fossa, and behind this another small cusp.

In neither the Chimpanzée nor the Gorilla do the teeth just described resemble in type those of a child; but if complication of surface can be considered as at all characteristic, the teeth of the former are more human than those of the latter; the principal cusp of the Gorilla covering a much larger portion of the crown, in addition to being relatively much longer.

The following letters were read, which had been recently received, viz.: —

From the Naturforschende Gesellschaft, Emden, February 19th, 1862; the Smithsonian Institution, March 18th, 1862; the California Academy of Natural Sciences, November 1st, 1862; and from the Royal Horticultural Society, London, Dec. 10th, 1862, acknowledging the receipt of the Society's publications. From the K. K. Akademie der Wissenschaften, Wien, August 1st, 1862, and the K. Preussische Akademie, October 15th, 1862, presenting their publications.

Temple Prime, Esq., of New York, was elected Corresponding Member.

Messrs. Eugene P. Robbins and Hiram S. Shurtleff, of Boston, and Dr. Augustine Shurtleff, of Brookline, were elected Resident Members.

March 4, 1863.

T. T. Bouvé, Esq., in the chair.

Mr. Charles J. Sprague read the following paper: —

Is the Heath indigenous to the United States?

In a paper laid before the Society in February last, I endeavored to show that the evidence adduced to prove the *Calluna vulgaris* to be a native of this country was neither direct nor conclusive. Since then I have examined this evidence more closely, and have become still stronger in my unbelief. The only testimony, which appears to possess any real weight, is a mention of it said to be made by De la Pylaie in an enumeration of the plants of Newfoundland. De la Pylaie is the authority quoted by various botanists for its publication as an American plant, and he seems to be the only authority. No other evidence rests on a scientific basis, or emanates from an authentic source.

Dr. Gray says that Dr. Don told him many years ago that a surveyor once brought a specimen from the interior of Newfoundland. Dr. Gray and Dr. Don are, of course, unimpeachable authority; but the engineer might have been deceived, especially as to its being native, if, indeed, he ever collected it.

This alone would scarce suffice to establish the fact of its being native here. I was told that Mr. Elias Durand had a specimen of *Calluna* collected in Labrador. He answers my inquiries on the subject by saying that he is convinced, on further investigation, that the specimen in question did *not* come from Labrador.

Hooker publishes the plant in the Index to the "Flora Boreali-Americana," p. 281. After the name in the list, "Calluna vulgaris, Salisb.," is an asterisk, referring to the following foot-note: —

"This should have been inserted at p. 39, as an inhabitant of Newfoundland, on the authority of De la Pylaie."

Not being able to obtain a copy of De la Pylaie's paper, I wrote to a literary friend in Paris, requesting him to refer to it, and to send me a copy of everything written by De la Pylaie in reference to the *Calluna*. In his answer, he says: —

"I obtained the '*Flore de Terre Neuve et des Iles St. Pierre et Miclon, avec figures dessinées par l' auteur sur la plante vivante. Paris*, 1829.' It is the copy presented by De la Pylaie himself to the Library of the Garden of Plants. It seems this is the only livraison which ever appeared. It has no figures. It treats entirely of marine plants. As there is no table of contents or index, I examined it page after page, and no mention is made of the Calluna vulgaris."

There is a reference made in the Flora Bor.-Amer., Vol. I, p. 31, to a paper on *Sarracenia purpurea* by De la Pylaie, thus: "De la Pylaie in Ann. de la Soc. Linn., v. 6, p. 388, t. 13." Thinking that the mention of Calluna might have been made in this paper, I requested my friend to examine this also. He says, in reply: —

"*There is no such work.* There is the Annals of the Linnæan Society, London, but the organ of the sister Society in Paris is 'Les Mémoires de la Société Linnéenne,' and of this publication *there is no sixth volume.* In the fifth volume there is mention made of two memoirs by De la Pylaie; one on *les cristatelles* (which is published in full in the volume) and the other on the *Sarracenia purpurea.* An asterisk refers the reader to this note at the foot of the page: — 'Ce mémoire paraitra dans le VI^e^ volume de nos Actes.' But the 'Mémoires' ended with the fifth volume, and 'actes' is used synonymously with 'Mémoires.' The catalogue of the Library of the Garden of Plants contains this note: 'The work ended with the fifth volume.'"

These statements, which render Hooker's reference so inexplicable, awaken some doubt whether De la Pylaie has anywhere mentioned *Calluna* in his printed papers. He is the prime authority for its occurrence in Newfoundland, and yet his record of it cannot be found. Dr. Gray tells me that Dr. Joseph Hooker found no clue to the Newfoundland plant. Certainly the published evidence is neither direct nor conclusive that *Calluna* was ever discovered in America. Dr. Gray, in his note to Mr. Rand's paper in Silliman's Journal, Vol. xxxiii., p. 27, says: — "If the claim for *Calluna* to be regarded as an American plant rested wholly or mainly upon this Tewksbury locality, it would not gain acceptance." It now appears that this is the only basis for such a claim. De la Pylaie's record may be somewhere found. But with all the evidence before us now, there would be reason to suppose some misapprehension on his part, unless his statements bear the undoubted mark of certainty.

Prof. Thomas McCulloch writes from Truro, Nova Scotia, to Dr. Gray, who has kindly lent me the letter: —

"In Nova Scotia, heather is unknown, save as an exotic. Upon the southern seaboard there exists a low, shrubby evergreen, exceedingly like it, and which I have heard asserted by Scotchmen to be heather. The plant in question I have never met with in bloom; but when in fruit, it bears a black berry about the size of a bird cherry. Off the seacoast it is taller, probably a foot high, and much more sparse. I have little doubt that it is the plant mentioned by Mr. Gisborne as occurring in Newfoundland. About ten years ago, when in Montreal, I was informed by Sir George Simpson, that in crossing a vast plain to the north-west, during his celebrated journey home through the Russian territory, he met with a plant so like heather that he felt perfectly confident that the existence of the latter in America was at last placed beyond question. A number of specimens were selected, and carefully carried in the crown of his hat, but, when submitted to competent parties in London, were pronounced to belong to a different class of plants altogether. In a recent letter from Frazer's River, I see it stated by a Scotch miner that heather is very abundant among the mountains; but it is very probable that he has erred in the point in question, just as Sir G. Simpson. The latter ought to have been pretty familiar with heather, as he was brought up in the highlands of Scotland."

Enclosed in Mr. McCulloch's letter was one from Mr. F. N. Gisborne, of London, who writes: —

" My belief, however, is, that no heather grows in the island (Newfoundland), or I should certainly have observed it when collecting mosses, &c., for my grandfather's valuable *hortus siccus*. I have walked across Newfoundland twice — from St. John's westward, via Piper's Hole (Placentia Bay), and Bay Despair to Cape Ray, opposite Cape Breton, and twice north and south from Gander Bay and Exploits Bay to Bay Despair. The foregoing surveys, independently of my duties as engineer, during the construction of the line of telegraph from Cape Race to Cape Ray (by boat), around *all* the bays and inlets eastward and northward to the Straits of Belle Isle.

" There are one or two small berry-growing plants that are very similar in *appearance* to heather, and which might readily be mistaken for that plant, but I have never met with it in bloom or otherwise."

Thus it seems to be pretty well ascertained that *Calluna vulgaris* does not grow at the present time in Northern America, except at Tewksbury. There can be scarce a doubt that its occurrence there is adventitious. Those who are familiar with the plant, where it grows naturally and abundantly in Europe, say that its growth is quite dissimilar there. Mr. Elias Durand, who is thoroughly familiar with the heather of Brittany, writes me: —

" I must repeat that your Massachusetts *Calluna* is a very remarkable form, which I never saw before; and, not later than the summer before the last, I was in Bretagne, where I saw plenty of heaths, old and loved acquaintances, and did not see those large and globular flowers which your Massachusetts *Calluna* shows."

The Tewksbury plant has the characteristics of a greenhouse growth, differing from the common European forms of the wild plant in points which are likely to be affected by cultivation.

The doubts thus awakened as to any mention of the plant by De la Pylaie; the absence of any single, authentic specimen of the plant ever collected in America; and the peculiar appearance of the Tewksbury growth, added to the evidence adduced in my former article, all lead to the conviction that the *Calluna vulgaris* is not indigenous to the United States, nor to Northern America.

The Secretary read a paper by Mr. A. S. Packard, Jr., on Synthetic Types in Insects.

Mr. S. H. Scudder made some remarks upon the structure of the head in hexapod insects. He mentioned some of the difficulties which beset the investigator, and showed that the law of centrifugal development exhibited in the thorax of insects, in their growth from larva to imago, was illustrated during the development of the head, not in the sub-division of the rings of which it is composed, but in the tri-partition of the appendages borne upon the lower portion of the rings.

The following letters were read, which had been recently received, viz.: —

From the Secretary of the Trustees of the New York State Library, Albany, Feb. 17th, 1863, and the Buffalo Society of Natural Sciences, February 18th, 1863, acknowledging the receipt of the publications of the Society; the Botanical Society of Canada acknowledging the same, and asking for certain numbers in addition. From Thomas Macfarlane, Esq., Acton Vale, Canada East, February 9th, 1863, and G. A. Boardman, Esq., Milltown, Maine, February 18th, 1863, acknowledging their election as Corresponding Members; and from Benjamin D. Walsh, Esq., Rock Island, Ill., acknowledging the same, and presenting some of his Entomological papers.

Mr. Samuel R. Carter, of Paris Hill, Maine, was elected Corresponding Member.

March 18, 1863.

The President in the chair.

Prof. Jeffries Wyman exhibited drawings of a Cyclopean Pig, accompanying them by the following remarks: —

This specimen was a male, about ten inches in length, and the last of a litter of nine, all the others being well formed. The snout was of a cylindrical shape, about one inch and a quarter in length, and was said to have been originally longer, but was contracted by alcohol. The end of it was enlarged, perforated by a single nostril, papillated, and surrounded by scattered bristles. A section through the nose showed the existence of a partial septum. The eye was unnaturally large, the upper lid regularly arched, but the right and left halves of the lower formed an acute angle with each other, the apex of the angle extending downwards upon the face. Both the lids were rudimentary, forming a simple border to the projecting globe. There were two pupils to the eye, but the two irides were fused on the middle line. Behind each pupil was a lens, but behind the lenses only a single vitreous body. The ears were disproportionably large, and these, with the trunk-like snout, gave to the whole head some resemblance to that of an elephant.

The end of the upper jaw was covered with a discoidal enlargement, or "button," but the lower jaw was entirely wanting. The lower lip was very short, and far back, leaving a large part of the roof of the mouth uncovered. The mouth ended backwards in a *cul-de-sac*. The œsophagus had no opening externally, but above ended in the two Eustachian tubes. There was no tongue.

The frontals, as usual in Cyclopean monsters, were prolonged into the base of the snout, and included between them, beneath, a small quadrangular bone, — probably a rudiment of the ethmoid. The nasals were represented by a hollow cylindrical piece, twisted to the right side, and fissured beneath. The sphenoidal fissures of the orbit were connected with each other, on the middle line; a single median optic foramen existed, and behind this, in the cranial cavity, a single clinoid process. One large and one small foramen above the optic, gave passage to the nasal branch of the ophthalmic portion of the fifth pair, this branch passing into the snout above the ethmoidal plate previously mentioned.

The two lachrymals were represented by a single bone, though this was perforated by two foramina for the lachrymal ducts. The upper maxillaries were bent strongly downwards, forming a conical-shaped mass, supporting two canines at the end, and enclosing the germs of four milk molars.

There were neither inter-maxillaries nor lower jaw, though there was a well-formed glenoid fossa for the articulation of the latter with the temporal bone. The two tympanic bones coalesced, but the Eustachian tubes opened freely into the cavities of the tympana.

The cerebral hemispheres, as usual in the Cyclops, were represented by a single and symmetrical cerebral lobe, without a middle division or sulcus. The convolutions were few and symmetrical; the cerebral walls were very thin in the middle of the upper portion, and the cavity was filled with fluid.

The olfactory and hypoglossal nerves were deficient, but all the other pairs were traced.

This specimen belongs to the fourth species of Cyclopism described by Vrolik, with which there coexists deficiency of the lower jaw. The fusion of the tympanic bones with each other shows a tendency in the sides of the base of the head to come together, which may be carried so far, as shown by specimens described by Vrolik, that the alveolar borders of the upper maxillary bones are drawn nearly to the median line, and the eyes, instead of being on the upper lateral region, are actually found on the under surface of the head, and the ears meet in the same region, on the middle line beneath the place of union of the head and neck. In another stage, the maxillary bones, very much reduced, approach each other still nearer; the malar bones coalesce, as also the palatines and intermaxillaries.

The last stage of this series of malformations of the head is found in the Perocephalus, in which all the facial and the frontal bones have disappeared, and the other cranial bones are imperfectly developed. The only external parts of the head in this case is a pair of ears.

Mr. S. H. Scudder exhibited a specimen of *Sphinx cinerea* Harris, which had died in confinement while passing from the larval to the pupal state.

The hinder extremity of the body, from the third abdominal segment backward, was entirely like the perfectly formed pupa, except that the swelling at the base of the anal horn in the larva had not entirely subsided, and that the excisions found on the anterior border of the segments at the stigmatal line were not quite fully developed; but the form, the structure of the anal button and the adjacent parts, with the general sculpture of the integument, were altogether pupal. The anterior portion of the body, on the other hand, was almost altogether larval; the head and legs of the caterpillar were there; the integument seemed to be in a sort of transition state, the dorsum of the thorax showing indistinctly the mapping out of the sutures of the pupal thorax, and even partially the pitting of the surface, while the transverse wrinkling of the larva still remained; the second segment behind the head showed a very considerable swelling upon the sides, not extending upon any other segment, which was the rudiments of future wings. The ventral surface of the two segments behind the legs was much sunken, and the pellicle thin, soft, and colorless, quite in contrast with the adjacent more hardened pellicle — evidently to give space for the anticipated intrusion of the wings, feet, and antennæ of the pupa; but one continuous pellicle seemed to cover the whole animal, in one part wholly pupal, in another larval, while in others it retained in part the characters of each, which would seem to imply that the change had been going on by a simultaneous process of absorption and building up of the particles of the same skin.

Prof. J. P. Cooke gave an account of a new spectroscope recently made for him by Mr. Alvan Clark, of Cambridge.

The Secretary read the following letters received since the last announcement, viz.: —

From the President of the University of Vermont, March 5th, 1863; the Superintendent of the Geological Survey of India, Calcutta, April 10th, 1862, acknowledging the receipt of the Society's publications; the same, April 5th and 10th, and July 15th, 1862, presenting publications of the Survey.

Mr. G. H. Emerson, of Cambridge, was elected a Resident Member.

DONATIONS TO THE MUSEUM.

January 7. A collection of Mollusca, from Beaufort, N. C., by Dr. S. Kneeland. Nest of a Carpenter Bee, *Xylocopa*, with its living inhabitants, 3♂, 1♀ imagos, and a Fungus from the Rappahannock River, Va., by Lieut. Col. Underwood. *Helix suppressa*, from Baltimore, by Mr. W. C. Cleveland.

January 21. Jaws of a Shark, from Rockport, Mass., by Mr. Addison Gott. Galena from Warwarsing, Ulster County, N. Y., by Mr. H. Kelly. *Beluga*, or White Whale, which died at the Aquarial Gardens, by Mr. P. T. Barnum.

February 4. Specimens of wool of Alpaca, Llama, and Vicuna, by Mr. Samuel Wells, Jr.

February 18. Three specimens of *Lagopus albus*, and one of *Cyanurus cristatus*, from Quebec, C. E.; specimens of copper pyrites, talcose slate containing copper, and variegated copper ore, from Leeds, C. E., by Dr. C. T. Jackson.

March 4. Tracing of a part of two townships, twenty miles west of Marquette, on Lake Superior, at the headwaters of the Carp and Escanaubia Rivers, exhibiting the location of every beaver dam in the section represented, the largest being 457 feet in length, by Mr. J. S. Fay. Specimens of *Cyathophyllum*, from Glen Haven, N. Y., by Mr. N. R. Wadleigh. Specimens of different species of *Hyla*, *Rana*, *Lacerta*, *Syngnathus*, *Lepidogaster*, *Seriola*, and *Echeneis*, various crustaceans, and the embryo of a young bird, from the shores and waters of the Gulf of Mexico, by Mr. H. A. Purdie.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1863.

Saggio di Ditterologia Messicana di Luigi Bellardi, Parte 2. 4to. Pamph. Torino 1862. Also, Appendice. 4to. Pamph. Torino, 1862. *From the Author.*

Recensio Avium in Academici L. B. de Mueller Ornithologico Museo Stuttgardiano collectarum. Col. Dr. C. G. Calwer. 8vo. Pamph. Stuttgardiæ, 1854. *From the Author.*

On the Flora of the Devonian Period in N. Eastern America. By J. W. Dawson, LL.D. 8vo. Pamph. Montreal, 1862. *From the Author.*

Transactions of the Massachusetts Horticultural Society for 1862. 8vo. Pamph. Boston. *From the Society.*

Correspondenzblatt für Sammler von Insecten insbesondere von Schmetterlingen. 8vo. Pamph. Jahrgang 1, 2. Nos. 1–24. Regensburg, 1860-61. *From S. H. Scudder.*

Zur inneren Mechanik der Muskelzuckung. Von Prof. Dr. E. Harless. 4to. Pamph. München, 1862. *From the Author.*

Ueber einen neuen Respirations-Apparat. Von Dr. Max Pettenkofer. 4to. Pamph. München, 1861. *From the Author.*

Monographie der Fossilen Fische. Von Dr. A. Wagner. 4to. Pamph. München, 1861. *From the Author.*

Bibliographia librorum Entomologicorum in America Boreali editorum, Auc. Guil. Sharswood. Supplementum. 8vo. Pamph. *From the Author.*

Description of a new Quadrumanous Mammal of the Genus Midas. By J. H. Slack, M. D. 8vo. Pamph. Philadelphia. *From the Author.*

Bulletin of New York Academy of Medicine. Vol. 2. Nos. 1–4. 8vo. Pamph. 1863. *From the Academy.*

Observations on the Genus Unio. By Isaac Lea, LL.D. Vol. 9. 4to. Pamph. Philadelphia. *From the Author.*

Monograph of the order Pholadacea, and other papers. By Geo. W. Tryon. 8vo. Pamph. Philadelphia, 1862. *From the Author.*

Ostéologie Comparée des Articulations du Coude et du Genou chez les Mammiferes, &c. Par Charles Martins. Pamph. Montpellier, 1862. *From the Author.*

Burmah: Its People and Natural Productions. By Rev. F. Mason, D.D., &c. 8vo. Rangoon, 1860. *From the Author.*

Fifteenth Annual Report of the Regents of the University of the State of New York. 8vo. Pamph. Albany, 1862.

Contributions to Palæontology. By James Hall. 8vo. Pamph. 1860. *From Prof. James Hall.*

On the Genera of Aphidæ found in the United States. 8vo. Pamph. Philadelphia, 1862. By Benjamin D. Walsh.

Insects injurious to Vegetation in Illinois. 8vo. Pamph. 1861. By the same.

List of Pseudoneuroptera of Illinois contained in the cabinet of the writer, with descriptions of over forty new species, and notes on their structural affinities. 8vo. Pamph. Philadelphia, 1862. By the same.

Fire-Blight: Two new Foes of the Apple and Pear. 8vo. Pamph. Chicago, 1862. By the same. *From the Author.*

Exploration of the Red River of Louisiana in 1852. By R. B. Marcy. 8vo. Washington, 1853.

Reports upon the Agriculture of Massachusetts. By C. L. Flint. 2 vols. 8vo. 1859. 1861.

Transactions of the Wisconsin State Agricultural Society. 1851–53. 8vo. Madison.

Transactions of the Illinois State Agricultural Society. Vol. II. 1856–7. 8vo. Springfield.

Geological Map of the United States, &c. By Jules Marcou. 8vo. 1853. *From C. J. Sprague.*

Die Culturpflanzen Norwegens. Beobachtet von Dr. F. C. Schübeler. 4to. Pamph. Christiania, 1862.

Norges Officielle Statistik, Utgiven 1. Aaret 1861. 4to. Pamph. Christiania.

Ethnographisk Kart over Finmarken. No. 4, af J. A. Friis, 1861.

Beskrivelse over Lophogaster typicus af Dr. Michael Sars. 4to. Christiania, 1862.

Geologiske undersögelser i Bergens omegn af Th. Hiortdahl og M. Irgens. Med et Tillæg om Fjeldstykket mellem lærdal og urland samt om Profilet over Filefjeld af Dr. Th. Kjerulf. 4to. Pamph. Christiania, 1862.

Hoidemaalinger I. Rorge fra 1774–1860. Samledea A. Vibe. 8vo. Christiania.

Sitzungsberichte der K. B. Akademie der Wissenschaften zu München, 1861. II. Heft 1–3. 1862. I. Heft 1–4. II. Heft 1. 8vo. Pamph.

Archiv für Naturgeschichte. 1861. Heft 6. 1862. Heft 3. 8vo. Berlin.

Physikalische Abhandlungen der K. Akademie der Wissenschaften zu Berlin. Aus dem Jahre 1861. 4to.

Mathematische Abhandlungen der K. Akademie der Wissenschaften zu Berlin. Aus dem Jahre 1862. 4to.

Zeitschrift für die Gesammten Naturwissenschaften. Bd. XVIII. Heft 7–12. XIX. 1–6. 8vo. Berlin.

Wochenschrift des Vereines zur Beförderung des Gartenbaues in den K. Preuss. Staaten für Gartnerei und Pflanzenkunde. Nos. 17–49. 4to. Pamph. 1862. Berlin.

Jahrbuch der K. K. Geologischen Reichsanstalt. Nos. 2, 3. 1861–2. 8vo. Wien.

Wiener Entomologische Monatschrift. Band 1–5. 1857–61. 8vo. Wien.

Jahrbücher des Vereins für Naturkunde im Herzogthum Nassau. Sechszehntes Heft. Wiesbaden 1861.

Bericht über die Thätigkeit der St. Gallischen Naturwissenschaftlichen Gesellschaft. 1861–2. St. Gallen. 1862.

Dritter Bericht des Offenbacher Vereins für Naturkunde über seine Thätigkeit. Vom 12 Mai, 1861, bis zum 11 Mai, 1862. 8vo. Pamph.

Würtembergische Naturwissenschaftliche Jahreshefte. Nos. 1, 2. 1862. 8vo. Pamph. Stuttgart.

Der Zöologische Garten. Jahrg. III. Nos. 7–12. July–December, 1862. Frankfurt am M.

Ergebnisse der Witterungs-Beobachtungen zu Emden 1860–1. Von Dr. M. A. F. Prestel. 4to. Pamph.

Jahresbericht der Naturforschenden Gesellschaft in Emden. Von Dr. H. Metger. 8vo. Pamph. 1861.

Sitzungs-Berichte der Naturwissenschaftlichen Gesellschaft Isis zu Dresden. Jahrgang, 1861. 8vo. Pamph.

Mémoires de l' Académie Impériale des Sciences de St. Petersbourg. Tome III., No. 12. Tome IV., Nos. 1–9. 4to. 1861–2. Also Bulletin, Tome IV., Feuilles 11–25. 4to.

Comptes Rendus Hebdomadaires des Séances de l' Académie des Sciences. Tomes 46–53. 4to. Paris, 1858–61.

Journal de Conchyliologie. Tomes I, II. 8vo. Paris, 1861–2.

Bulletin de la Société de Geographie. Tomes III., IV. 8vo. Paris, 1862.

Bulletin de la Société Géologique de France. 2e Serie. Tome XIX. Feuilles, 1–20, 33–58. 8vo. Pamph. Paris, 1862.

Mémoires de la Société de Physique et d'Histoire Naturelle de Genève. Tome XVI. 2e Partie. 4to. 1862.

Actes de la Société Linnéenne de Bordeaux. Tome XXIII. Livraisons 1–6. 8vo. Pamph. 1860.

Actes de l'Académie Impériale des Sciences, Belles-Lettres et Arts, de Bordeaux. 3e Série. 23e Année. 1er 3me et 4me Trimestre. 8vo. Paris, 1861.

Memoirs of the Geological Survey of India. Vol. IV. Part 1. 8vo. Calcutta, 1862.

Memoirs of the Geological Survey of India. Palæontologia Indica. Nos. 1, 2. 4to. Pamph. Calcutta, 1862.

Annual Report of the Geological Survey of India. 8vo. Pamph. Calcutta, 1862.

Transactions of the Royal Irish Academy. Vol. XXIV. Part 2. 4to. Pamph. Dublin, 1862.

Journal of the Royal Dublin Society. Nos. 24, 25. 8vo. Pamph. 1862.

Proceedings of the Royal Society. Nos. 48–51. 8vo. Pamph. London, 1862.

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Scottish Cryptogamic Flora. By R. K. Greville. F. R. S., &c. 6 vols. 8vo. Edinburgh, 1823.

Botanique Cryptogamique. Par J. Payer. 8vo. Paris, 1850.

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On some new Fungi. By Rev. M. J. Berkeley, F. L. S. 4to. Pamph. London, 1857.

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Commentary on the Synopsis Fungorum in America Boreali, &c., By Rev. M. J. Berkeley, F. L. S., and Rev. M. A. Curtis. 4to. Pamph. *Mycological Library of C. J. Sprague, Esq., from Courtis Fund.*

Annals and Magazine of Natural History. Nos. 61–63, January–March, 1863. London.

Quarterly Journal of the Geological Society. Vol. XIX. Part I. February, 1863. 8vo. London. *From Courtis Fund.*

The Works of Wm. Hogarth. 2 vols. 4to. London.

History of Harvard University. By Josiah Quincy, LL. D. 2 vols. 8vo. Cambridge, 1840.

Dictionary of Americanisms. By J. R. Bartlett. 8vo. Boston, 1860.

Miscellaneous Works of Sir Philip Sidney. 8vo. Boston, 1860.

Works of Benjamin Franklin, with Notes and Life of the Author. By Jared Sparks. 10 vols. 8vo. Boston, 1840.

History of Spanish Literature. By George Ticknor. 3 vols. 8vo. New York, 1854.

Life of the Duke of Wellington. By Col. J. M. Tucker. 8vo. London.

Life and Writings of Rufus Choate, with a Memoir of his Life. By S. G. Brown. 2 vols. 8vo. Boston, 1862.

The Book-Hunter. By J. H. Burton. 12mo. New York, 1863.

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New England Historical and Genealogical Register. Vol. XVII. No. 1. 8vo. Pamph. 1863. *Deposited by the Republican Institution.*

April 1, 1863.

The President in the chair.

The President read a letter from Mr. G. A. Peabody, dated Cotuit Port, Cape Cod, March 20th, 1863, from which the following extract is taken:—

I send you a vial containing apparently mature spawn, pressed without force from a speckled trout, taken yesterday from a pond near here, without inlet or outlet. It is the third female noticed in this condition; another had very small immature spawn, such as one would expect to see at this season of the year. One male, upon pressure, gave out what looked like milt, but not very abundantly, and as one would expect to see at the end of the breeding season. There is no reason to suppose that the trout were bred in this pond, as many had been put into it the last few years, under the impression that there were none there. It seems to me a very extraordinary thing finding spawn in trout at this time of the year in this condition, as October is the proper month, and I have never heard of any such case as the present.

Mr. A. Agassiz gave the following communication:—

The family of *Berenicidæ* of Eschscholtz, as adopted by Prof. Agassiz in his Tabular View of the known Hydroids, in the fourth volume of his Contributions, contains two very distinct families. Prof. Agassiz had been induced, from the figures of *Berenix* and *Cuvieria*, to unite with them the genera *Willia* and *Proboscidactyla*, which have ramifying chymiferous tubes. During the summer of 1862, I found at Nahant, quite commonly in August and September, a striking Jellyfish, which had not been observed before, and which settles the relations of the *Berenicidæ*. They have nothing in connection with the *Williadæ* of Forbes, but belong nearer to the *Æquoridæ;* they have all the characters of Medusæ, coming from Campanularians, while the *Williadæ* belong to the Tubularians. The genus to which I allude resembles *Tiaropsis* in having like it large compound eyes, from three to six, between each two chymiferous tubes. There are in addition numerous club-shaped tentacular cirri, resembling those of *Laodicea,* while the flatness of the disc, the general appearance of the chymiferous tubes, and of the digestive cavity, remind us of *Stomobrachium* and *Æquorea.* The digestive cavity sends off four large chymiferous tubes, from each of which radiate from three to four chymiferous tubes which reach the circumference. Young specimens have only four simple chymiferous tubes. In older specimens there is one additional tube on each side of the primary one, and afterwards the tubes are added irregularly; sometimes we find specimens which send off four, others five branches from the different primary tubes. This Medusa attains a size of several inches in diameter —from three to four inches. Specimens measuring about one inch in diameter have only the four principal tubes. I think there can be no doubt from the figures of *Berenix* and *Cuvieria*, given in the illustrated edition of Regne Animal of Cuvier, that this genus, which I would call *Halopsis*, is closely allied to *Berenix*. The disc of this Medusa is perfectly colorless; the lips are short, generally carried in four simple lobes, as in *Oceania* (*Thaumantias* Auct). The eyes of this species are large, the tentacular cirri long, and the principal tentacles very much thickened at base. The ovaries do not extend quite to the circular tube from the base of the digestive cavity. For this species I would propose the name of *H. ocellata*. I may also add here that Prof. Agassiz has satisfied himself, after having examined this Medusa, that the *Berenicidæ* of Eschscholtz and the *Williadæ* of Forbes are two distinct families, and should not be united, as they have been in his tabular view referred to above.

Prof. Jeffries Wyman made the following observations

On the Mechanism of the Tibio-tarsal Joint of the Ostrich.

In the ordinary locomotion of the Ostrich, the tarsus as it passes from a state of flexion to that of extension, or the opposite, completes its movement with a sudden jerk. The mechanism of this has been studied by Sir Charles Bell.* According to his explanation, the jerking motion depends upon the tension of one of the lateral ligaments, caused by its rising over a tuberosity on the inner side of the condyle of the tibia. This tuberosity forms a double inclined plane; and as the tarsus moves backwards and forwards, the ligament, as it slides over the bone, becomes tense when it reaches the summit of the tuberosity, which would be about midway between flexion and extension; passing this point, it slips with a jerk into the groove before or behind the tuberosity. In this account no notice is taken of the form of the articulating surfaces.

From a recent dissection of an ostrich, we are satisfied that the tuberosity makes no essential difference in the tension of the ligament, having but a very slight elevation, and that in the extreme positions the ligament does not slip into the grooves as stated by Sir Charles Bell.

According to our observations, the tension of the ligament depends

* The Hand. London, 1854. p. 94.

almost entirely upon the form of the articulating surfaces, which is such that the tarsus is at the greatest distance from the centre of motion (i. e., the upper attachment of the lateral ligament) when it is midway between the two extreme positions, which is at an angle of 60° with the position of the greatest extension, and of 40° with that of the greatest flexion. Passing beyond the point of the greatest tension forwards, it suddenly slips upon a curve of shorter radius, when it meets with less resistance, and as the elasticity of the ligament now comes into action, the tarsus is brought suddenly nearer to the centre of motion, and thus moves forward with a jerk.

Moving backwards, after passing the position of the greatest tension, it comes upon a curve of larger radius, but at the same time nearer to the attachment of the ligament; and as here it meets with less resistance again, it moves suddenly backwards, until it is nearly in a straight line with the tibia. In this last position its further motion is arrested, in consequence of the curve of the bone being of a large radius, and thus carrying the tarsus further from the centre, and also in consequence of striking against a projection of cartilage on the lower end of the tibia.

The ligaments which become tense during these movements are the long internal and external lateral ones. In front of the inner one, and nearly parallel to it, is a short ligament, which becomes stretched only when the tarsus reaches its greatest extension. On the outer side, the long ligament is crossed by the shorter one, this last serving too to resist extension beyond a straight line. The relative stretching of the inner and outer long ligaments may be learned from the following measurements: —

	Inner.	Outer.
When tarsus is extended . . .	8.60 in.	3.05 in.
" " half-flexed . . .	8.70 "	2.97 "
" " flexed . . .	7.95 "	2.75 "
Whole amount of stretching . .	0.75 "	0.30 "

From this it will be seen that the stretching is confined mostly to the inner long ligament, which increases in length 0.75 of an inch, while the outer is stretched only 0.30 of an inch.

The ligaments above described are composed of white fibrous tissue, but which seems to be endowed with a greater degree of elasticity than is usually found in this substance. It is supposed by most anatomists to be wholly destitute of this property, and is doubtless as inelastic in most cases as it is possible for any animal tissue to be.

The Corresponding Secretary read the following letters received since the last announcement, viz.: —

From Samuel R. Carter, Paris Hill, Maine, March 16, 1863, in acknowledgment of his election as Corresponding Member; Henry Davis, McGregor, Iowa, March 23d, 1863, proposing exchange of shells, &c.; the Verein für Naturkunde, Wiesbaden, November 1st, 1862; St. Gallische Naturwissenschaftliche Gesellschaft, St. Gallen, November 20th, 1862, acknowledging the receipt of the Society's publications; Verein für Naturkunde, Wiesbaden, November 1st, 1862, Offenbacher Verein, November 10th, 1862, presenting their publications.

Mr. Bouvé announced the arrival of the boxes containing the casts of the bones of the Megatherium in the British Museum, presented by Joshua Bates, Esq., of London.

Prof. Charles E. Hamlin, of Waterville, Me., was elected Corresponding Member.

Messrs. George L. Vose and John Wetherbee, Jr., of Boston, and Mr. L. Trouvelot, of Medford, were chosen Resident Members.

April 15, 1863.

The President in the chair.

Dr. C. T. Jackson presented to the Society a series of specimens of the magnesian limestone of the Lower Silurian series of Prairie du Chien, containing crinoids and fossil shells characteristic of that formation, namely, Orthis striatula, Strophomena expansa, Pleurorhyncas, Rhynconella, and a species of Nucula or of Lingula. These fossils and rocks form the upper portions of the bluffs in Prairie du Chien, near the Mississippi and Kickapoo Rivers, and overlie the white sandstone strata, which bear the galena veins of Dubuque and Galena, and the deposits of copper ore near Prairie du Chien.

Dr. Jackson gave a description of the mode of occurrence of the galena at Dubuque, and stated that it is found in crevices and small caverns in the white sandstone, generally quite loose and free from the rocks, and surrounded by ferruginous clay. No deep running veins of the ore have been discovered, and there are no deposits of sufficient extent to warrant the erection of permanent works for mining operations; and hence the business of lead mining in that region is very precarious, success being as it were almost accidental. Thousands of "Gopher holes," as the rude pits are called, exist in the bluffs around Dubuque and Galena, and the lead ore, when found, is raised by the windlass and tub, by hand labor, no horse or steam whyms being erected at any of the "diggings," as these shallow mines are justly called.

Dr. Jackson then gave some theoretical views as to the origin and deposition of galena in the crevices and caverns of these rocks, and stated that since galena is readily volatilized at a temperature below that required for its reduction, it could have been easily raised in the form of vapors, which would arise either through crevices or even through the very porous white sandstone and be deposited in vacant spaces in the rocks, and even in the cavities of fossil shells. The occurrence of galena in such fossils had been cited to prove the aqueous origin of that mineral, but he thought the known facts could be more easily and satisfactorily accounted for by the theory of sublimation or of metalliferous vapor emanations from the interior of the globe; while it would be very difficult to prove galena to have been derived from aqueous solution and deposition from water, since it is wholly insoluble.

He thought the copper and iron ores might have been formed by sublimation of the chloride of copper and of the sesqui-chloride of iron, and these chlorides having been decomposed by emanations of gaseous sulphide of hydrogen, would form the sulphides of copper and of iron, which would unite in various proportions, producing the well known sulphides of copper and iron, such as are found in most copper mines. Water alone will convert the sesqui-chloride of iron into peroxide of iron, the hydrogen of the water taking the chlorine and forming chlorhydric acid, while its oxygen unites with the iron, forming either specular or hæmatite iron ores.

In illustration of the porosity of the white sandstone rocks, Dr. Jackson observed that a pit was sunk 184 feet deep at Dubuque, to serve as a "shot tower," and that no water stood in the bottom of that pit. He also observed that no water was drawn up at the numerous lead mines which he visited, and that wells were quite impracticable in these sandstones when above the river level.

Specimens of the hæmatite contained bunches of silky green carbonate of copper, a secondary product of the decomposition of the copper pyrites; sulph*uret* of copper being first converted into the sulph*ate*, and then, by the action of carbonate of lime, decomposed into sulphate of lime and carbonate of copper. This ore is found like the lead ore in chasms in the white sandstone, associated with ferruginous clays, and does not form regular deep seated veins, so that no dependence can be placed upon it by miners. Indeed, both at Mineral Point and at Prairie du Chien, the copper ore was found to give out at a very moderate distance from the surface.

In the course of the discussion which followed, Dr. Jackson alluded to the lead ore of Shelburne, N. H., which bears unmistakable proofs of partial fusion in place, since its deposition, and attributed this semi-fusion to the hot vapors which brought up the materials of the copper pyrites, which incrusts the crystals of the partially fused galena.

Rev. Mr. Denton made some statements confirmatory of Dr. Jackson's views as to the sublimation theory, and also as to the age of the rocks presented; he having travelled through the lead regions of the Western States, and viewed the fossils in the rocks and the lead ores in the mines. He stated that he had seen a cavern incrusted with crystallized galena, having a deposit of iron pyrites on its surface, so thick as to require it to be removed by the hammer, in preparation of the lead ore for reduction in the furnace.

Dr. B. J. Jeffries presented a specimen of the little brown snake (*Storeria Dekayii* Baird and Girard), captured in Newport Harbor, at least four or five hundred feet from the nearest wharf, although the species is strictly terrestrial in its habits.

Mr. Putnam remarked that in the State Cabinet there is a specimen of *Grystes fasciatus* Ag., which is said to have been taken from Massachusetts Bay, but which he thought could not have been the case, as the species has hitherto been found only in fresh water, and no nearer than Lake Champlain. He investigated the contents of the stomach of the specimen, hoping to find there the remains of some animal, an inhabitant either of salt or fresh water, but the only things found were the scales and a ventral fin of a fish, which proved to be the Alewife (*Alosa tyrannus* Dek.); thus nothing was gained, as this species, though an inhabitant of the salt water, ascends rivers leading into ponds and lakes to deposit its spawn.

Dr. J. B. S. Jackson presented, in the name of Mr. Francis H. Jackson, a hair-ball from the stomach of an ox, and exhibited a number of other specimens.

The general form of these bodies is round, though occasionally oval, very compact, and with no admixture of foreign substances; they almost invariably have a thin, smooth coating of a dull brownish color, occasionally lighter; but one specimen exhibited was entirely devoid of such a covering; seldom more than one ball is found in the stomach of a single animal, and no injury is known to result from their presence; one instance however was referred to, where no less than sixteen were found; their occurrence seems to be confined to cattle, with the infrequent exception of pigs, one of the specimens exhibited being from that animal, oval in form, with no coating, the coarse bristles of the outer surface being very regularly arranged on either side of a median line; it was stated that it is no uncommon occurrence to find them in the stomachs of pigs kept near slaughter-houses, where sheep are prepared for the market, in which case they are formed of wool.

Mr. A. E. Verrill presented a Supplementary Notice of Neosorex palustris.

In a previous notice of this species (p. 164) we attempted to establish the identity of *N. albibarbis* Cope, with *Sorex palustris* Richardson. One of the chief differences was at that time shown to consist in the lighter color of the lower surfaces of the tail and body in Richardson's specimen, than in those described by Mr. Cope and myself; but the Museum of Comparative Zoölogy has quite recently received an additional specimen, collected by my brother, G. W. Verrill, at Norway, Me., July 4th, 1862, which confirms the opinion previously expressed in regard to the identity of the two forms. In this individual (No. 1154, M. C. Z.), which is also a female, the tail is distinctly bicolored, with the lower surface light gray, and even nearly white near the base, and the upper side very dark brown like the back, resembling thus Richardson's specimen very closely, as it does, also, in proportions. The back and whole upper surface of the body is very dark brown or almost black; the abdomen brownish gray; throat light gray; chin and upper lips white; the feet smoky brown above, and more thickly clothed with short appressed hairs than in the specimen previously described, with which it agrees very closely in all other characters. This specimen seems, however, to be more completely adult, the size being somewhat greater and the teeth more strongly colored with dark chestnut, including even the fifth upper premolar, which is, nevertheless, quite invisible from the outside; in relative size and form of the teeth, this does not differ from the specimen already described, except that the lobes and serrations are more sharply defined. The tail is distinctly quadrangular.

MEASUREMENTS.

Nose to tip of tail	5.90	inches.
" root of tail	3.00	"
" occiput	1.00	"
" tip of ear	1.10	"
" eye	.48	"
" extended hind foot	3.80	"
Length of tail to tip	2.90	"
" tail to end of bone	2.70	"
" fore leg from knee	.88	"
" fore foot	.42	"
" hind leg from knee	1.44	"
" hind foot	.74	"
" longest toe	.28	"
" whiskers	.80	"
Between eyes	.25	"
" extended feet	3.40	"

Mr. Verrill stated that during the present week seven Caribou (*Rangifer Caribou* Aud. and Bach.) had been brought to the city by Mr. J. G. Rich, who had killed them near the northern boundary of Maine, on the head-waters of the Kennebec. They formed part of a herd numbering about twenty, which, as Mr. Rich supposes, have come from some region farther north, owing to the severity of the winter. These are the only specimens that have been killed in Maine, to his knowledge, during the past five years, with the exception of one, now in the Museum of Comparative Zoölogy, which was killed by the same person two years ago. Mr. Rich states that this species, like the true reindeer, feeds entirely upon moss.

Mr. F. W. Putnam stated that he had found in two species of a genus of Chromoids (fresh-water fishes of South America) a mode of caring for the young similar to that discovered by Prof. Wyman in several species of *Bagrus* from Surinam,—the parent taking and keeping the eggs in the mouth until the young are fully formed. In the genus *Bagrus* Professor Wyman found that it was the male that took charge of the eggs, while in the Chromoids it is the female. The specimens in which this peculiar fact was noticed were presented to the Museum of Comparative Zoölogy by Rev. J. C. Fletcher, from the Rio Negro, and by Professor Wyman, from Surinam. In these specimens the eggs and young were found in all stages of development.

Prof. Jeffries Wyman gave an account of some peculiarities in the structure of Beluga (see Jour. Vol. VII, No. 4).

Dr. F. W. Lewis of Philadelphia was elected Corresponding Member.

Mr. Chas. K. Stevens of Boston, and Mr. Chas. A. Hewins of West Roxbury, were elected Resident Members.

May 4, 1863.

ANNUAL MEETING.

The President in the chair.

The Treasurer presented his report, by which it appeared that there had been paid into the treasury during the past year especially for building purposes, \$46,267, including the bequest from our late associate and former President, Dr. Benjamin D. Greene, of \$9,000, now for the first time announced. This sum, added to that previously received from different quarters, and to sums subscribed but not yet collected, amounts to \$53,025.44 as the total sum presented to the Society in aid of the new building.

The total receipts of the Society for the year amounted to \$72,507.76, and the total expenditures \$61,224.31, of which \$58,685.75 were paid out for the new building, leaving a cash balance in the hands of the Treasurer of \$11,283.45. The property of the Society, not including the land upon which the new Hall is situated, the library or collection of the Society, was estimated at \$139,007.11. The report was accepted.

The Auditing Committee reported that they had examined the accounts of the Treasurer, and found them correctly cast and properly vouched; and their report was accepted.

The Librarian in his report stated that there had been added to the library during the past year 85 volumes and 416 pamphlets and parts of volumes, mainly through exchange with kindred associations. An attempt had recently been made to increase the number of these exchanges, and it was hoped that before the close of the year the number of societies in correspondence would amount to two hundred. From the Courtis Fund there have been received 49 volumes and 34 parts of volumes, being the first time for many years that the

Library Committee had had at their disposal the share originally assigned to them from the income of this fund.

To all these should be added the munificent bequest of the late Dr. Benjamin D. Greene, from which the Society has come into possession of his valuable library, very rich in illustrated botanical works, and probably more so than any library in New England; so that this department is now more richly endowed than any other.

The Curator of Geology and Palæontology stated that the principal addition to his department during the past year was in the casts of the bones of the Megatherium, from Joshua Bates, Esq., of London.

The other curators reported the collections under their charge as in a satisfactory condition, being safely housed and awaiting removal to the new building. No additions of much importance were announced.

The Nominating Committee reported a list of officers for the ensuing year.

The following were then elected: —

PRESIDENT,
JEFFRIES WYMAN, M.D.

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

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

RECORDING SECRETARY,
SAMUEL H. SCUDDER.

TREASURER,
THOMAS T. BOUVÉ.

LIBRARIAN,
CHARLES K. DILLAWAY.

CURATORS,

THOMAS T. BOUVÉ,	Of Geology and Palæontology.
CHARLES J. SPRAGUE,	Botany.
THOMAS M. BREWER, M.D.	Oölogy.
HENRY BRYANT, M.D.	Ornithology.
F. W. PUTNAM,	Ichthyology.
THEODORE LYMAN,	Radiata.
J. C. WHITE, M.D.	Comparative Anatomy.
SAMUEL H. SCUDDER,	Entomology.
B. JOY JEFFRIES, M.D.	Microscopy.

Mr. F. W. Putnam made some statements concerning the Frogs and Toads found about Cambridge, Mass.

He stated that he had for several years past been searching for the eggs of the little Piping-frog, *Hylodes Pickeringii* Holbrook, but had not met with success until the present season. On the 17th of April, after watching the movements of these frogs, in the ditch on the Museum grounds, he concluded that the eggs were laid among the grass and floating water-plants, and upon carefully examining these plants he discovered a number of eggs. These eggs were not in a mass, or in a string, as is the case with the eggs of our other frogs and toads, but were isolated, being attached to the plants some distance apart. The tadpoles were hatched in about twelve days and were very long, coming from the eggs with a more marked tadpole form than is the case with our other species of frogs and toads with which he was acquainted.

The eggs of the Wood-frog, *Rana sylvatica* Le Conte, were found, for the first time, on the 18th of April. They were in a mass, about three inches in diameter, and attached to a spear of grass. The tadpoles were hatched in about six days.

The Toads, *Bufo americanus* Le Conte, were laying their eggs on the 24th of April, and in about ten days the tadpoles were hatched.

The *Scaphiopus solitarius* Holbrook, appeared in their old place, near the Botanical Gardens, in large numbers, on the 19th of April, and commenced the same day to lay their eggs in bunches of about one, two, and three inches in diameter; these bunches were floating on the water and were not attached to the grass, as was the case when seen in previous years. On the 29th of April, another set of Scaphiopus visited the place, and laid eggs which were attached to the grass as formerly. The tadpoles of this species are hatched in about six days.

On the 29th of April, several peculiar strings, or bands of eggs were found; these strings consisted of three rows of eggs enclosed in one envelope. The tadpoles were hatched in five days. These may prove to be of some species of Tree-toad, *Hyla*.

Rana Catesbiana, *R. fontinalis*, *R. palustris*, and *R. halecina*, have not laid their eggs up to the present time.

The following is the time of appearance of our species of Anura, as observed about Cambridge during the present season: —

Hyla versicolor Le C., Tree-toad, about the middle of April.

Hylodes Pickeringii Holbr., Piping-frog. April 6.

Bufo americanus Le C., Toad. April 7.

Scaphiopus solitarius Holbr. April 19.

Rana sylvatica Le C., Wood-frog. April 11.

Rana palustris Le C., Spotted-frog, Marsh-frog, or Pickerel-frog. April 18.

Rana halecina Kalm., Spotted-frog or Marsh-frog. April 6.

Rana fontinalis Le C., Green-frog. April 11.

Rana Catesbiana Shaw, (*R. pipiens of authors*,) Bull-frog. About the middle of April.

The following letters were read, which had been recently received, namely: —

From the Smithsonian Institution, July 22d, and Aug. 19th, 1862; K. K. Geologische Reichsanstalt, Wien, September 29th, 1862; K. K. Central Anstalt, Wien, October 7th, 1862; K. Akademie der Wissenschaften, Wien, November 1st, 1862; Institut Imperial de France, Paris, October 20th, 1862; K. U. Bibliothek zü Göttingen, December 16th, 1862; Leeds Philosophical and Literary Society, December 3d, 1862; Verwaltungsrath der Zoologischen Gartens, Frankfurt, January 8th, 1863; acknowledging the receipt of the Society's publications. From the K. Hof-und-Staats-Bibliothek, München, November 6th, 1862, acknowledging the same, and asking that missing numbers may be supplied. From the K. Bayerische Akademie der Wissenschaften, München, November 6th, 1862, acknowledging the same, and presenting various publications.

May 20, 1863.

The President in the chair.

Prof. Wyman, in exhibiting the stomach and heart of the "white whale," offered some additional remarks to his former communication on the same subject.

Mr. S. H. Scudder gave an account of the distinct zones of life on high mountains, as illustrated in the entomology of the White Mountains of New Hampshire.

He recognized, as had been done in the Alps of Europe, three regions, — the first a mountain region, corresponding with the Canadian fauna, which includes the whole of the White Mountain district below the limit of forest growth; and above this a subalpine region, corresponding generally with the range of the dwarf spruce; while the extreme summits of Mts. Adams and Jefferson, and a considerable portion of Mt. Washington, including the northern part of the plateau lying south of the highest peak, nearly down to the level of the Lake of the Clouds, belongs to an alpine region, the insects of which show a remarkable correspondence with those of the extreme north of our continent. Peculiar to the alpine region, and not trespassing at all upon the subalpine, is found a species of *Chionobas*, a genus peculiar to the very highest latitudes of the continent. Within the subalpine region, and not found outside of it, he discovered a new species of *Argynnis* (*A. montanus* Scudd.) belonging to a section of the genus which is peculiar to the subarctic regions, being found neither north nor south of it, and also a new species of grasshopper belonging to the genus *Pezotettix* (*P. glacialis* Scudd.), likewise a subarctic genus, though not so strictly limited in its range. As neither of these species of the subalpine region had been discovered to the north, but were represented there by other species of the same genera, he was inclined to think that the facts militated against the theories which had been put forth by others to explain the correspondence of the plants of these alpine summits with those of Greenland and Labrador.

Prof. Wyman inquired whether all the facts might not be accounted for on the theory of migration northward after a glacial epoch.

Mr. Scudder thought they could not, if the species found upon the barren summits of the mountain were, as he believed them to be, distinct from those of the same genus found to the northward. He believed also that we were sufficiently acquainted already with the insects from the north to hazard such a statement; there was, for instance, a species of *Argynnis* found from Eastern Labrador to Great Slave Lake, so closely resembling the one found upon the White Mountains as to be readily mistaken for it at first sight, and yet occupying the area where, if anywhere to the northward, this White Mountain species would be found; he believed that we could not expect to find these so closely allied species occupying the same area.

Prof. W. B. Rogers suggested that the facts might be accounted for on the migration theory, if we added thereto the supposition of subsequent variation induced by isolation.

Mr. A. Agassiz remarked that such an explanation would not satisfy us in parallel cases of resemblance, as where, for instance, upon the coast of Washington Territory, at the seashore, we had recalled to us so strongly the entomology of the mountain region of the Alps of Europe. The genus *Parnassius*, otherwise quite peculiar to the mountain region of Europe, was found here, and no less than twenty-four species, representing at least twelve genera and ten families of European butterflies, had their representatives in closely allied species found upon our west coast.

Mr. C. J. Sprague asked whether this distinction of faunæ held equally well upon our continent from east to west as from north to south.

Mr. Scudder replied that it did, as he had already pointed out in a paper read to the Society upon the genus Colias some months previously, and remarked that in the comparisons referred to between Western America and Europe it was not simply the intimate connection of one and another species taken at random that we had to account for, but also the much more significant fact of the close relationship of the faunæ of the two distant countries as a whole, oftentimes in direct antagonism to the character of the faunæ of the intervening areas. He alluded to the case just mentioned by Mr. Agassiz, of the association of Parnassius with large numbers of Lycenidæ, and no Teriades, which characterizes Western America and Europe alike, quite the opposite of which is seen in Eastern America.

Prof. Rogers thought we ought not to lose sight of the fact that there was a similar coincidence in the physical characteristics of the countries.

Mr. A. E. Verrill mentioned that the similarity between the animals of the two regions referred to was not confined to the land animals only, but was exhibited also in their Polyps. He also stated that an undescribed species of frog, found by himself on the Mingan Islands, in the Gulf of St. Lawrence, had been found by Mr. Scudder in Hermit Lake, at the upper portion of the mountain region of the White Mountains, and had not as yet been discovered elsewhere. The Rocky Mountain Swallow (*Hirundo lunifrons* Say), which had been instanced as a case of recent migration, being now found in considerable abundance on the Atlantic coast, had been found in Maine, as he had recently learned, so long ago as 1810.

Prof. Rogers suggested that by a subsidence of a portion of the western continent, and an elevation of the land now lying submerged between America and Europe, we might have once had a physical continuity of coast, with all these species, or their common progenitors, extending alike along its whole area, and that with the elevation and subsidence of the land to its present condition the contrasted or similar physical conditions gradually developed would cause the destruction or propagation of the different species, so that they should at last assume their present character and limits.

Mr. F. W. Putnam alluded to the distribution of some of our fresh-water fishes in Lake Superior, Lake Champlain, and the lakes of Maine, where, out of many that were common to all, some few, found in the others, were wanting in one. If we were to account for the presence of those found in all of them by the supposition of a previously existing great inland sea including all these lakes in one, why are a few forms absent in some, and present in others? It could not be through their destruction by the others, for the two largest and most fierce, Lepidosteus and Amia, were wanting in the lakes of Maine, though present in Lakes Superior and Champlain.

Prof. Wyman referred to the occurrence of certain forms, generally considered specific, within areas of exceedingly narrow limits, such as that of the *Bufo*, found hitherto only in the town of Danvers, Mass., and indeed, so far as known, confined to the limits of a single garden; and of *Scaphiopus*, for which there are only a few localities. The theory of local creation would seem to be carried to excess in supposing this species to have always remained the same in character and localization. He further suggested, in view of the fact that these animals inhabit very limited localities, whether it was not quite possible that those species detected on Mount Washington might yet be discovered to the northward, when a more complete survey of the arctic regions should be made. Our knowledge of these is not yet sufficiently complete to enable us to say that the species in question are entirely absent from them.

Mr. Verrill presented a paper entitled

ADDITIONS TO THE CATALOGUE OF THE BIRDS FOUND IN THE VICINITY OF CALAIS, ME., AND ABOUT THE BAY OF FUNDY. BY A. E. VERRILL.

Since the publication of the list of birds presented to the Society last June,* which was compiled mainly from manuscript notes furnished to me by Mr. G. A. Boardman, some additional species of considerable interest have been found by him, which I take this opportunity briefly to notice.

Picoides hirsutus Gray. Banded Three-toed Woodpecker. Several specimens of this species have been obtained during the past severe winter by Mr. Boardman, yet they must be considered as rare winter visitors.

Contopus borealis Baird. Olive-sided Flycatcher. Summer visitant. Not common. Only one specimen yet obtained.

* These Proceedings, page 122.

Empidonax minimus Baird. Least Flycatcher. Summer visitant.

Empidonax flaviventris Baird. Yellow-bellied Flycatcher. This species, already indicated from Grand Menan, has since been found by Mr. Boardman.

Parula americana Bon. Blue Yellow-backed Warbler. Summer visitant. Two specimens obtained.

Protonotaria citrea Baird. Prothonotary Warbler. Of this species, hitherto probably unknown in New England, Mr. Boardman obtained a single male specimen the last day of October. It was shot near his house on a tree in the edge of a swamp.

Dendrœca maculosa Baird. Magnolia Warbler. Specimens of this species, collected by myself at Grand Menan, August 1859, are in the Museum of Comparative Zoölogy. Mr. Boardman also informs me that he found it breeding last season, and that it is not uncommon.

Vireo gilvus Bon. Warbling Vireo. Summer visitant. Not uncommon.

Phalaropus hyperboreus Temm. Northern Phalarope. This species, before mentioned without specific name, is very abundant in flocks in the Bay of Fundy, as early, at least, as August, and possibly breeds about some of the islands.

Phalaropus fulicarius Bon. Red Phalarope. One specimen obtained.

Thalassidroma pelagica Bon. Least Petrel. One specimen.

Larus glaucus Brünn. Burgomaster Gull. Specimens of this species were obtained by Mr. Boardman during the past winter.

The Golden-Crested Wren (*Regulus satrapa* Licht.) was resident during the whole of the past winter at Calais, as well as in other parts of Maine.

A specimen of native antimony was presented by Dr. A. A. Hayes, with the following communication in regard to it: —

Some months since I described the sulphuret of antimony as occurring near Fredericton, New Brunswick, in a regular vein, promising to become of economical value. On the 6th of May I identified the present rare mineral in specimens sent to me from Quebec, Canada. It occurs in a talcose slate with gray quartz, near Quebec; the exact location will be given in a future communication. The metal is connected with oxides of antimony; no sulphur is present, and I hope to find the whole series of oxidized compounds of antimony in the same locality. The last accounts from the mine are favorable to the conclusion that a regular vein will be found; many masses of the native metal have already been obtained.

Prof. Rogers announced that the sections of the act of the Legislature granting lands on the Back Bay to the Society, in common with the Institute of Technology, which necessitated a payment of money to the State upon certain conditions relative to the sale of the surrounding land, had been repealed by the present Legislature. Prof. Rogers was appointed a committee to act in behalf of the Society in any formalities which might be necessary for the ratification of the act repealing said conditions.

The following gentlemen were elected Corresponding Members: —

Dr. Wm. O. Ayres, of San Francisco, Cal.; Capt. N. E. Atwood, of Provincetown, Mass.; Prof. Edward Tuckerman, of Amherst, Mass.; Prof. Daniel Wilson, LL. D., of Toronto, C. W.

June 3, 1863.

The President in the chair.

The following paper was presented: —

THE PENOKIE MINERAL RANGE, WISCONSIN. BY CHARLES WHITTLESY, OF CLEVELAND, OHIO.

The copper-bearing strata of Pt. Kewenaw (Lake Superior) extend south-westerly across the boundary of the State of Michigan into Wisconsin. These strata constitute a long, narrow and bold mountain range from Copper Harbor to Long Lake, a distance of one hundred and sixty miles. There are no stratigraphical breaks along this line, the order of the rock being everywhere the same. The dip of the beds is always northerly or northwest, and the strike to the northeast or east, the general line of outcrop being northeast by east. On Point Kewenaw, and as far southwest as the Akogebe Lake, on the west fork of the Ontonagon River, the copper veins have been found valuable.

Beyond the waters of the Ontonagon, in the same direction, veins have been discovered, but after limited workings have been abandoned. The Montreal River forms the boundary between *Michigan and Wisconsin;* and as early as the year 1845 mining locations were made on its waters where they pass the range. Locations were also made upon the waters of the Bad or Mauvaise River, a stream with numerous branches, draining the country from the Montreal to the headwaters of the Chippeway and St. Croix Rivers.

Historically considered, the exploration of this region commenced in the year 1840, when Dr. Houghton, as a commissioner of the State of Michigan, accompanied Capt. Cram of the United States Topographical Engineers, who was then surveying the Menominee and Montreal Rivers.

In 1840 and 1841 Dr. Houghton examined the rocks on both these streams, and the country between their sources. I am in possession of a transcript of his field notes during these explorations. In 1845–6 I made examinations along the range across the Montreal to the westward, as far as the main branch of Bad River.

Up to this time the public lands in this part of Wisconsin had not been surveyed. The fourth principal meridian was extended northward through Wisconsin to Lake Superior in 1848. Dr. A. Randall, one of the assistants of Dr. Owen upon the survey of the Chippeway Land District, in reference to mines and minerals, accompanied the linear surveyors along this line. In Town 44 north Dr. R. discovered an outcrop of magnetic iron ore, and brought in a specimen. The next season, as a member of Dr. Owen's corps, I made an exploration on the western branches of Bad River, crossing southerly to the head waters of the Chippeway. Near Lac des Anglais, and thence easterly across the middle or main fork of the Bad River, I found cliffs and bluffs of silicious magnetite. The results of this examination may be seen in the final Report of Dr. Owen, published at Washington in the year 1850.

In the Chippeway language the name for iron is *pewabik;* and I thought it proper to designate the mountains, where this metal exists in quantities that surprise all observers, as the "Pewabik Range." The compositor, however, transformed it to *Penokie*, a word which belongs to no language, but which is now too well fastened upon the range by usage to be changed.

Soon after the publication of Dr. Owen's Report, the excitement of 1845–6 in reference to copper was repeated in reference to iron. The government was at last induced to make surveys of the region. Preemptors followed the surveyors, erecting their rude cabins on each quarter section between the meridian and Lac des Anglais, a distance of eighteen or twenty miles. The iron belt is generally less than one-fourth of a mile in width, regularly stratified, dipping to the northwest conformable to the formations, and having its outcrop along the summit of the second or southerly range. Viewing this mountain region from La Pointe, or from the open lake, it has the appearance of a single crest. Its outline against the sky in a clear day is very distinct and regular. Along the range, this crest line is nearly level, its elevation above the lake being one thousand to eleven hundred feet. But there are two ranges, known in the country as the first and the second. or the "Copper" and the "Iron" range. There is not much difference in their elevation. The copper range being nearest the coast, covers the iron range, which, at the distance of thirty miles, is only visible through gaps and notches, the whole forming one blended line in the horizon. To the south, beyond the iron range, the country is lower and swampy.

Two roads were soon constructed to the mineral deposits through the dense evergreen forests of this latitude. One of them commenced at the lake, near the mouth of the Montreal River, and near the termination of the fourth principal meridian, extending thence south and not far from the meridian line. The other began on Chegoimegon Bay, at Ashland, pursuing also a southerly course, and, after reaching the second range, connected along it to the eastward with the first road, passing the cabins of the pre-emptors. In 1859, Mr. Daniels, of the Wisconsin Geological Survey, and Mr. Lapham, of Milwaukie, examined the iron range in behalf of a company which had made extensive purchases there, and had caused a survey for a railway to be made with a view to the manufacture of iron.

Mr. Lapham's report was published in pamphlet form, but as yet no iron works have been erected there. The region was again examined by me in 1860, on the part of the State of Wisconsin. As my reports upon the Bad River Country, and those of 1858, "Upon the rocks of the Menominee River, associated with iron ores," have not been published, I propose to offer in this paper a brief notice of the analyses of specimens from the "Penokie" range, etc.

By referring to the "Proceedings of the American Association, for 1859," a short article will be found relating to the azoic slates of the Menominee, in which iron is a constant and large ingredient. So many discussions have taken place during the last fifteen years upon the origin of the azoic rocks in Canada and in Michigan that it becomes important to have all the results of chemical examinations before the public. I propose to do nothing more than present these results, with such a general description of the formations west of the Montreal River, on the south shore of Lake Superior, as will enable geologists to use them.

The profile accompanying my map for the Wisconsin Report of 1860 is made across the stratification, from the village of Houghton, on Chegoimegon Bay, in a southeasterly direction, through the Dalles of Tyler's Fork, in Town 45, North Range, 2 West. The formations are lettered A, B, C, D and E, reckoning downward from the Potsdam sandstone, A, to the sienite and granite, E. But for present use the profile will be taken along an ancient Indian trail, that leads from the mouth of Montreal River to Lac Flambeau, and the formations will be numbered 1, 2, 3, etc.

The provisional arrangement, which it is always necessary to make in the early stages of the examination of a new region, must of course be based upon the external characters of the rocks. In this case it is not only convenient, but proves to be a correct arrangement.

The following is a general view of the structure of the formations in the descending order: —

Formation No. 1. — *Potsdam Sandstone.*

On the Montreal River, *strike* northeast by east, in places N. 60° E.; *dip* northwest by north, 75° to 90°. It embraces four members, *a*, *b*, *c*, and *d*.

a.	*Sandstone Proper*, corrected for bevel, thickness,	8,500	feet.
b.	Alternations of sandstone and black-slate, thickness,	750	"
c.	Conglomerate, thickness,	1,800	"
d.	Alternations of trap and sandstone, thickness,	800	"
	Total	11,850	"

This is not the entire thickness of the Potsdam at the mouth of the Montreal. The synclinal line lies an unknown distance out in the lake, perhaps one-fourth of a mile, and whatever this distance may be should be added to the above statement. At the Apostle Islands and in Chegoimegon Bay the dip is reversed, having a direction towards the southeast; but the line along which the change occurs is covered either by the waters of Lake Superior or by drift. On the northerly side of the synclinal the plunge of strata is much less in amount. It presents the case of nearly horizontal beds on one side, and of nearly vertical ones on the other. Following the outcrop along the southerly shore to the west end of the lake, and thence along its northwesterly coast, the dip is everywhere conformable, and to the southeast. By estimates and measurements on that shore, combined with those at the Montreal, I regard its total thickness to be not less that fifteen thousand feet. No fossils have yet been found in the sandstone of the west end of Lake Superior. Its color is generally red, owing to the presence of oxide of iron. Where this is wanting, it is gray or a dull white, and in places mottled gray and red.

Formation, No. 2. — *Trappose, in two members.*

a.	Brown amygdaloid; dip and strike conformable to formation 1; thickness along Lac Flambeau trail,	$3\frac{1}{2}$	miles.
b.	Compact red and blue	$2\frac{1}{2}$	"
	Total	6	"

Formation No. 3.—Hornblendic.

Compact, sub-crystalline and slaty; black or dark colored; strike N. 60° E.; thickness on trail . . . . . $2\frac{1}{4}$ miles.

Formation No. 4.— Silicious, two members.

a. Quartz, slaty and in layers; dark colored, but less than *F.* 3; thickness variable; separated from *b* by a bed of magnetic iron and iron slate.

b. Quartz, slaty, in layers and beds; more compact and lighter color (gray and straw color) than *a;* novaculite; strike N. 60° to 65° E.; dip variable, 30°, 45°, 60°, 75° to the northwest; breadth across the edges on trail, $3\frac{1}{2}$ miles.

Formation No. 5.

Granites and sienites of Central Wisconsin.

Fifteen miles to the westward of the trail, on a parallel line from the mouth of Tyler's Fork to the Dalles, the total thickness of formations 2, 3 and 4, is reduced nearly one-half. The diminution, however, comes principally from the upper member, *a*, of formation 2, which tapers out in that direction very rapidly. Formation 3 is also somewhat diminished; yet formation 5 is not materially changed in thickness.

Further westward, beyond the middle or main fork of Bad River, the rocks undergo such changes in external characters, that until the test of analysis was applied, the separate formations could not be disentangled. In the midst of black slates that appeared to be trachytic, were large patches of red and blue crystalline rocks, having clearly the aspect of sienites. I will notice them hereafter.

Formation 1 is nearly pure silex, and is evidently of sedimentary origin. Some foreign geologists have essayed to place it nearly at the summit of the geological system, not only without evidence, but against the most conclusive proof. Dr. Houghton, Dr. Jackson and Dr. Owen at first lent color to such a classification, but on examination both the first and the last named gentlemen placed it in its true position, at the base of the paleozoic rocks. It has been traced stratigraphically beneath the Trenton and calciferous strata of the New York Survey; on the St. Mary's River at the Pictured Rocks; on the Escanawba, the Menominee, Oconto, Wolf, Wisconsin and St. Croix Rivers.

At the falls of the St. Croix abundance of fossils are found in it, such as characterize the Potsdam in New York. To persist in denying the effect of such observations is to rob all proof of its value, when it comes in contact with theory and assumption.

The black slate intercalated with the sandstone differs little externally from the slaty portions of formation 3. This member is very

ANALYSIS OF FORMATION 2 — TRAPPOSE.

Number.	Locality and Description.	Aspect.	Color of powder.	Specific gravity.	Moisture and loss.	Silex.	Ox. of iron. Per.	Ox. of iron. Prot.	Oxide of Manganese.	Alumina.	Lime.	Potash.	Magnesia.	
	Member a.													
1	Earthy; rough; dark gray. T. 46 N. R. 1, East.	Trappose.	Gray.	2.604	2.19	72.16	14.40	—	1.25	4.00	0.85	—	—	Carb. of Cop. 2.25
2	Black and red; fine grain. Penokie Road at Brunschweilers River.	Trappose.	Gr. gray.	2.838	1.16	85.20	6.39	—	0.68	0.80	0.95	—	2.57	Bisulph't iron 2.25
3	Black; compact; flinty. Phelps's location, Openike River.	Silicious.	Bl. green.	2.968	2.05	76.80	—	11.00	—	5.65	0.25	4.17	0.08	
4	Subcrystalline red. At Shaft Phelps's location.	Silicious.	Br'k red.	2.628	1.27	86.50	—	6.22	—	2.80	0.08	1.75	1.38	
	Member b.													
5	Compact; red; jointed. Log Bridge Creek, Lac Flambeau trail.	Porphyr'c.	Red. br'n	2.342	1.00	86.60	—	7.65	—	2.80	0.15	0.80	1.00	
6	Compact; dark gray. Phelps's location, above Cabin.	Flinty.	Red. gr'y	2.612	1.00	91.20	—	4.00	—	8.80	0 45	0.75	0.80	
7	Crystalline bluish gray. S. E. qr. Sec. 15, T. 45, N. R. 4, West.	Feldspat'c.	Dark gr.	—	1.00	88.85	—	6.55	—	1.25	0.80	—	—	Soda 1.50

ANALYSIS OF FORMATION 3 — HORNBLENDIC.

Number.	Locality and Description.	Aspect.	Color of powder.	Specific gravity.	Moisture and loss.	Silex.	Ox. of iron. Per.	Ox. of iron. Prot.	Oxide of Manganese.	Alumina.	Lime.	Potash.	Magnesia.
1	Subcrystalline; color light red. Sec. 34, T. 46, N. R. 1, West.	Porphyr'c.	Gray.	2.725	1.69	91.65	2.16	—	0.45	0.60	0.40	1.60	1.45
2	Compact; dark red. Same Section.	Flinty.	Red. br'n	2.590	1.75	92.90	3.20	—	—	0.40	1.00	0.75	—
3	Subcrystalline; reddish brown. N. W. qr. Sec. 29, T. 45, N. R. 6, West.	Coarse grained.	Reddish brown.	2.900	2.18	89.50	4.50	—	0.44	0.80	0.95	2.57	—
4	Subcrystalline; black. Sec. 34. T. 46, N. R. 1, West	Coarse, H. Blendic.	Greenish gray.	2.809	1.10	78.00	—	9 60	—	4.80	1.20	2.80	2.50
5	Subcrystalline and granular; dark gray. Lac Flambeau trail, 11 miles from Lake Superior.	Dark gray trappose.	Pea green.	2.923	1.60	89.20	—	3.60	0.75	0.75	0.80	1.40	1.90
6	Earthy; tender; dark brown. Gorge of Balsam River.	Trappose.	Bluish black.	2.768	1.06	56.00	—	24.00	2.88	10.00	1.26	2.50	2.00
7	Subcrystalline; tough; dark blue. Gorge of Balsam River.	H. Blendic.	Bluish black.	2.928	1.39	84.20	—	6.00	0.46	6.00	0.20	1.75	—
8	Crystalline; very coarse; bluish gray. Inlet of Bladder Lake.	Sienitic.	Ash gray	2.917	1.46	86.00	—	5.29	1.05	0.40	0.38	2.76	2.66
9	Crystalline; coarse; red and gray. Sec. 20, T. 45, N. R. 3, West.	Sienitic.	Bluish gray.	2.609	1.05	88.80	—	7.00	0.60	1.40	0.80	0.40	—

persistent along the copper range to the eastward in Michigan. It is visible in about the same relation to the conglomerate, at the Black, Iron and Ontonagon Rivers. At Black and Presque Isle Rivers I have noticed specks of carbonate of copper, disseminated, as in the Mansfelt slate. But one analysis has been made of this rock (formation 1, *b*), which is as follows: —

Specific gravity, 2,690. Color of powder, bluish gray.

Silex	75.60
Protoxide of Iron	14.00
Manganese	0.35
Alumina	7.30
Lime	0.95
Magnesia	0.95
Carbonaceous matter, moisture and loss	1 05
	100.00

In the belts of sandstone that alternate with trap, it is common to find native copper, out of the veins, disseminated in fine particles, crystals and spangles, in some places sufficient to pay for stamping and working the rock.

The analyses here given were made for the Wisconsin Survey by Professor J. L. Cassells, of the Cleveland Medical College.

Of formation 4, with the exception of specimens containing a large per cent. of iron and regarded as ores, only two were analyzed. This is a black fine-grained slate, with a silicious aspect, and dark gray powder. It was taken from near the iron belt above it, at a locality 3 miles southwest of the trail, and about 12 miles from Lake Superior.

1. Specific gravity, 3,049.

Carbonaceous matter and moisture	1.55
Silex	80.00
Protoxide of Iron	17.60
Oxide of Manganese	0 35
Alumina	0.25
Magnesia	0.25
	100 00

2. Compact, tough blue slate. T. 45, N. R. 1 East. Specific gravity, 2,740.

Moisture and loss	1.25
Silex	89.60
Protoxide of Iron	3.60
Oxide of Manganese	0.22
Alumina	2.40

Lime	0.25
Magnesia	1.63
Potash	1.05
	100.00

No specimen of the above lists is without the oxide of iron. In the protoxides, fourteen in number, the percentage ranges from 3.60 to 17.60. Of the peroxides, five in number, the per cent. varies from 2.16 to 14.40. With one exception, lime pervades the entire list, the proportion in no case attaining to *one per cent.* Magnesia is present in all but two specimens, the largest amount being 2.80.

A large portion of formation 3, west of Bad River, is coarsely crystalline, with a decided sienitic aspect. Around the west end of Bladder Lake it is of a light blue color; in other places flesh red. Specimens 8 and 9 of formation 3 represent this deceptive rock.

In composition, however, they range themselves with the other specimens of the formation, as substantially silex and iron. Five specimens show potash ranging from 1.45 to 2.66 per cent.

The absence of potash or soda in two of the trap rocks of formation 2, may be accounted for by the fact that in both cases the specimens were porous and exposed to the atmosphere.

The proportion of caustic alkalies is here much less than in the trap rocks of the same formation on Point Kewenaw, and the traps of other countries. The presence of both potash and soda is a characteristic of these rocks elsewhere, and also a much larger per cent. of alumina. In truth, the difference in mechanical condition, as well as chemical constitution, between these beds and those which contain valuable veins, is so great as to discourage us as to their practical value.

In No. 1 of formation 4, there is found carbonaceous matter like the black slate of the Potsdam sandstone, formation 1. Among the slates of this series there are no instances of the dark green color that characterizes chloritic and magnesian rocks, or which might indicate the presence of silicates of iron. The silex is evidently in excess over all substances that might act as bases, and thus the quartz and iron oxides are proven to be mechanical mixtures.

There are so many differences between these rocks and those opposite them on the southerly side of the granitic core of the State, that we should hesitate before we class them together. In the azoic slates of the Menominee River, I was unable to determine the stratification, if any exists. The Bad River system is everywhere stratified, and is also conformable throughout.

On the Menominee there are no intercalations of Potsdam sandstone, and no beds of trap. On the Bad and Montreal Rivers there are no masses of crystalline limestone. The quartz beds of the Menominee are portions of the Potsdam in a compact form. They rest upon the edges of the laminæ of the green azoic slates. The quartz beds of the Montreal and Bad Rivers are far below the Potsdam, and are schistose. Iron enters into the composition of the silicious formation No. 4, while the quartzite of the Brule is pure silex.

For the purpose of more fully exhibiting the difference between the azoic slates on the waters of the Menominee and the systems represented above, I insert some analyses made in 1858.

In both systems the oxide of iron is an universal constituent, but with one exception in the azoic rocks it is in the form of protoxide. This exception is in a surface specimen, and may be the result of higher oxidation by exposure. Silex is the principal substance in the slates of both systems as well as in the compact portions. On the Menominee, it ranges from 52½ to 92 per cent.; on the Montreal, 56 to 93. As the silex decreases, the iron increases, these being the principal ingredients. The azoic slates are much more aluminous than those of the Bad River region. Both carry the elements of hornblende in limited quantities, and might for that reason be called hornblende rocks, but this term conveys no hint of their origin or chronology, and is, therefore, without any other than a mineralogical significance.

The Menominee system is both laminated and lamellar, with occasionally a silky lustre, and a magnesian feel and aspect. The slates of the Montreal are laminated, but rough to the touch, and have a silicious aspect. In this region the laminæ conform to the uplift in strike, and in their dip conform to the stratification. It is different on the waters of the Menominee. There the ridges or local uplifts and the bearing of the slates are at various angles, and the dip of the laminated portions is various and irregular. The uplifts have the character of corrugations, resulting from lateral pressure, and if, as it seems is now pretty well established, lateral pressure gives rise to lamellæ and flattened spangles, it is fair to presume such to have been the origin of the uplifts. On the shore of Lake Superior the whole country has been moved together and with great regularity. The entire series has either been lifted in mass by one movement or by successive uplifts that were parallel in direction, and about equal in amount. This applies to the Ontonagon, Portage Lake and Point Keweenaw portion as well as that of the Montreal and Bad Rivers. If the Potsdam should hereafter be discovered in the swamp region south of the Penokie Mountains, it would throw light upon the age of these rocks. Formation 2 of the above section in its upper portion, is contemporaneous with the Potsdam. The azoic slates of the southerly watershed are more ancient. Are the black slates of formations 3 and 4 contemporaneous with the green slates of the Menominee? Are either or both of them metamorphic? Can we assign them a position in the Canadian system?

ABSTRACT OF THE ANALYSIS OF SPECIMENS OF THE AZOIC ROCKS OF THE MENOMINEE RIVER. BY PROF. J. L. CASSELLS.

No of the group.	External Characters.	Locality.	Specific gravity.	Silica.	Alumina.	Protoxide of iron.	Lime.	Magnesia.	Manganese.	Moisture at 212 F.	Loss.
1	Texture rough; color brownish black; compact with a few crystalline faces; not affected by weather; general aspect igneous.	Menominee River, 6 miles above Kitson's bend.	2.776	88.00	5.25	4.14	0.56	0.28	0.18	1.50	0.09
2	Conchoidal; fine grained; flinty; dark yellowish-green small crystals of iron pyrites; aspect of novaculite.	S. line of T. 33 N. R. 18 E. Wis., representing many localities.	2.608	92.00	3.40	Sulphide 2.00	0.80	trace	—	1.45	0.35
3	Tough conchoidal and splintery; dark green with whitish gray blotches; aspect igneous.	Above and below White Rapids & other localities.	2.730	84.00	6.80	4.38	1.20	2.28	0.30	1.00	0.04
4	Sectile; falls to pieces in the weather; brick red with dun spots; magnesian aspect and feel.	Red Pipe Stone Island and many other places.	2.592	82.40	5.60	Peroxide 6.85	1.40	1.80	—	H. & C. 1.80	0.15
5	Rough; sub-crystalline, not hard or brittle, tough; dark green and grayish white mottled.	Embraced in No. 4.	2.867	87.50	4.60	Prot'xide 4.88	0.35	0.65	0.30	1.52	0.20
6	Rough; few crystalline faces, tough and hard; dark green to black, under a magnifier mottled trappose aspect in the mass.	Pemene Falls & two other localities.	2.822	82.00	6.25	6.21	3.20	0.73	0.36	1.20	0.05
7	Splintery and conchoidal; compact passing into slate; blackish green and brownish black; jointed.	Very numerous localities.	2.886	76.00	3.60	12.00	4.80	2.00	—	1.35	0.25
8	Coarse earthy; cut with a knife, gray, mottled with dark green, weathers darker with a stain of iron; magnesian aspect.	Sturgeon Falls, and other places	3.104	73.70	5.00	16.00	2.80	0.25	0.40	1.75	0.10
9	Sectile and fissile; soft, shining powder, yellowish brown; labelled silvery talc.	Sandy Portage.	2.252	52.55	12.15	16.92	12.80	4.24	—	1.03	0.34
10	Fibrous and lustrous; cut by the nail; dark gray; greasy feel; powder greenish white.	Lower Bekuenesec Falls.	2.782	61.21	11.20	24.35	0.85	0.42	—	H. & C. 1.60	0.37
11	Crystalline; very tough; rough fracture; dark green mottled; powder greenish white.	Head of the gorge, Upper Bekuenesec Falls.	2.870	67.20	12.00	7.64	10.00	1.46	0.36	1.20	0.14
12	Earthy; easily pulverized; dark green; small crystals of iron; powder greenish gray; in beds of a trappose cast.	Section 22, T. 42 N. range 34 west, Michigan.	2.503	55.20	10.00	30.41	trace	trace	0.50	H. & C. 3.88	0.01
13	Splintery; flinty; laminated and jointed; powder pea green; hornblendic aspect.	T. 35 N., Range 16, East Wisconsin.	2.912	82.30	6.60	6.00	1.79	1.60	0.48	H. & C. 1.25	0.08
14	Compact; brownish gray; powder brownish white; feldspathic aspect.	T. 35, R. 15, E. Wisconsin, representing a large tract.	2.604	90.25	2.76	3.38	1.65	0.88	—	H. & C. 1.00	0.08
15	Compact; fine grained flinty; jointed; bluish gray; weathers light gray; translucent at the edges; green; powder greenish white.	Southeast part of T. 35, Range 15, E. Wisconsin.	2.675	86.80	3.60	5.04	1.68	1.88	—	H. & C. 0.80	0.20

The President exhibited a document submitted to him by Dr. H. C. Perkins, of Newburyport, giving a drawing and an early account of the Sea Serpent, of the latter of which the following is a transcription: —

"The above is a figure of a Sea Serpent, seen on a passage from Newburyport to St. Petersburg (Russia), on board the brig Washington, Joseph Brown, Master, August 1811, in lat. 60° 30′ N. and long. 7° 45′ W. He was in sight three hours or more, and came up within forty feet abreast of us, and remained several minutes, as described above, his head eight or nine feet above water; judged him to be sixteen or eighteen inches diameter, and seventy or eighty feet in length. He appeared to be very smooth, and in color like a porpoise — back black and belly white. He did not appear at all startled at the sight of the vessel, but turned his head toward us till we passed him, about twice the length of the vessel astern of us. He sank gradually under water for several minutes, and then rose again gradually, and so continued to rise and sink as long as I could see him with a good glass. When we first discovered him, supposed it to be a vessel's mast, at about three miles distance, two points on the weather bow, and hauled up for him, and did not discover that he was alive till within a mile of us. He appeared to move along about two or two and a half miles an hour, and his course about N. N. E. and very steady. He never altered his course from the time we first saw him, nor as long as we could see him with a good glass, and his motion of alternately rising and sinking at short intervals of time was the same during the whole time.

(Signed) JOSEPH BROWN.

The President gave an account of the early discussions relative to the Sea Serpent by the Linnean Society of New England, and stated that the original animal, concerning which a committee was appointed and gave their lengthy report, had since been rediscovered, and proved to be a black snake (*Coluber constrictor*) with a diseased spine.

Dr. Pickering said that it should be stated to the credit of the late Prof. Peck, who was upon the committee referred to, that he was in a minority of one in support of the same opinion. He also stated that an explanation had been given of the various appearances by which the stories of the Sea Serpent had arisen, by an old whaler, namely, that it was a hump-backed whale scooping fish, the upper jaw being elevated, forming the supposed erected head and neck, and the hump representing the imagined vertical curvature of the serpentine body.

Prof. Asa Gray read the following paper: —

The Morphology of the Andrœcium of the Fumariaceæ.

By J. T. Rothrock.

My observations were made upon *Dicentra spectabilis*, a good representative of the natural order *Fumariaceæ*, and well adapted for the present purpose. The flower in this order is dimerous. There are two small and scale-like sepals, and four petals in two distinct sets. Before each of the two exterior and larger petals stands a phalanx made up of three dimorphous stamens, *i. e.* the middle anther of each phalanx is two-celled, or complete; the lateral ones are one-celled or, as it were, dimidiate. Now, the question is, Are the stamens morphologically two, but each divided by chorisis or deduplication into three? Or are they normally four, one before each petal, but those belonging before the inner petals divided in some way each into two half-stamens, and these half-stamens so separated as to be associated, one on each side, with the stamen before each outer petal, and united with it diadelphously, so as to make two phalanges, each of a complete stamen in its proper position, and of a half stamen on each side out of position?

The latter view was suggested by De Candolle, and afterwards more fully developed by Lindley. If this be the correct view, we should expect (going back to an early stage in the development of the flower) to find the one-celled stamens originating before the inner petals, where they belong; and also, as they answer to a single leaf, we should look for a connection between their fibro-vascular bundles, and for no connection with those which supply the middle stamen. The theory of this view, moreover, supposes a deduplication or chorisis, *i. e.* a fission of each of one set of stamens into two, and then a cohesion, more or less complete, of the severed parts with the unaltered stamens. The opposing and first-named view supposes only a chorisis, without displacement, but into three instead of two members. Those botanists, therefore, who reject the idea of chorisis, cannot very consistently adopt the Candollean explanation; for that, in fact, assumes a chorisis no less than the other view.

The view of a simple chorisis, dividing the stamens of a diandrous andrœcium each into three, has been adopted by Gray, on general morphological considerations, and afterwards by the late M. Payer, on organogenic observations.

Upon this view, we should expect to find all three members of a phalanx originating in connection, and in the position which they occupy in the developed flower, viz., before the outer petals, leaving the space before the inner petals vacant. And as each phalanx morphologically represents a single trifoliolate leaf, its fibro-vascular bundles should originate in connection, or in proximity, and should be such as belong to one leaf. It is the object of this communication to record the opinion, founded on repeated observations upon the early bud, that this, the simpler view, is sustained by the facts.

Taking a raceme of *Dicentra spectabilis*, in which the lowest flowers had fairly opened, while the upper were still minute buds, I traced all gradations from the perfectly-developed stamens down through earlier stages until the filaments were no longer visible. The smaller flower-buds of a still younger raceme showed only three small united excrescences before each of the outer petals: these were the only indications of the future stamens. I then placed a flower-bud, about one-hundredth of an inch in diameter, on a glass slide, and, after removing the sepals, subjected it to a magnifying power of fifty diameters. The petals were too small to meet at the top and cover in a central portion where the organs of generation were to be developed. Hence I was able to see the nascent organs exactly *in situ*. The three excrescences on each side had dwindled to a single, slight protuberance; and very close examination was required to discover the lines at which the division into three stamens was ultimately to begin.

The relative size of the slight lobes of the protuberance was in proportion to the future anthers, *i. e.* the middle lobe, which represented the two-celled anther, was fully twice as large as those on either side of it which were to have but one cell each. Before the inner petals there was no sign of any nascent stamen. Evidently, the one-celled stamens do not originate there. Here, then, we have the case obviously resolved into one of chorisis. The three stamens occupy the place of one. The relative position of the stamens in the full-grown flower is the one with which they start, and in which they continue during the entire period of their growth.

In the distribution of the fibro-vascular bundles going to the stamens, everything points to the same conclusion.

Divide the flower in halves at right angles to its flat surface, and continue the division straight on through the middle of the pedicel; then, through the base of, and in the same plane, with the stamineal phalanx, make a section thin enough to be transparent; continue this section until it runs out into the split surface of the pedicel. Two primary fibro-vascular bundles will be seen going up through the pedicel. After giving off branches for the ovary, sepals and petals, two large trunks run on into the middle stamen. The trunk on the right sends off a branch to the half-stamen on that side, and the half-stamen on the other side receives a branch from the corresponding main trunk. Stating the facts with direct reference to the morphology of the stamens, we see no more primary divisions of fibro-vascular bundles going to the phalanx than would go to one stamen. The lateral stamens are supplied from the trunk which supplies the middle stamen: whereas, if these were respectively halves of one stamen, we should expect to be able to trace their fibro-vascular bundles into a common trunk, or at least into an intimate relation. No such relation was detected.

Therefore, from the distribution of the fibro-vascular bundles, as well as from the development of the andrœcium, I conclude that the stamens are not four, of which two are bisected and separated, but, morphologically, two, alternate with the inner petals, and each divided into three by chorisis.

Dr. B. G. Wilder presented a paper entitled "Concerning Morphology and Physiology, especially in the limbs of Mammalia," which was referred to the Publishing Committee.

Mr. F. W. Putnam remarked, in reference to a notice of the appearance of *Grystes fasciatus* Ag. in salt water, to which he had referred at a recent meeting, that he had since learned that it had been introduced into the ponds on Cape Cod in great quantities, and therefore its appearance in Boston Harbor did not seem so unaccountable.

In response to an inquiry of Prof. Wyman, Mr. Putnam said that he had repeatedly found the nest of the robin built upon the ground, but only in New Hampshire; and in one case he had found a nest, in which the young were reared to maturity, built upon the beam connected with the moving machinery of a saw-mill which was in daily use throughout the summer.

Mr. Bouvé stated that the red-headed woodpecker (*Sphyropicus varius*) had done remarkable injury to his house at Hingham while unoccupied. These birds had made a number of large round holes through the closed blinds of an upper story window, and going into the room to see what damage had been done, he found the glass broken in a number of places, some being evidently broken by blows from without and some from within. No stones or any missiles were found in the room, and the only possible explanation was in the supposition that a woodpecker, having bored through the blinds and broken a pane of glass from without, sufficient for ingress, had attempted to escape, and not finding the opening by which its entrance was effected, had moved along the sash, and by repeated tappings had broken numerous holes, till one was made sufficiently large for its passage out; for there were two holes found of sufficient size, one broken from within and one from without.

Baron Osten Sacken, Russian Consul at New York, and Dr. John J. Craven, U. S. A., were elected Corresponding Members.

Messrs. John Quincy Thaxter and Charles Bartlett, of Boston, and Dr. John E. Tyler, of Somerville, were elected Resident Members.

June 17, 1863.

The President in the chair.

The following paper was presented:—

MALACOZOÖLOGICAL NOTICES, NO. 1. BY DR. WILLIAM STIMPSON.

In some recent investigations among the Mollusca of the District of Columbia. a few facts have been observed which may be worthy of being placed on record.*

I. ON THE GENUS GUNDLACHIA.

This name was proposed by Dr. Pfeiffer (Zeitschrift für Malak. 1849. p. 97. and 1853. p. 180) for a remarkable shell discovered by Dr. Gundlach in the fresh-water lakes of Cuba. The specimens first described were not adult. and had the appearance of an Ancylus with the posterior two-thirds of its aperture closed by a horizontal septum. and it was not until several years afterwards that the adult was discovered. when it was found that the shell first described was merely the apicial portion of a much larger and somewhat crepiduliform shell, the form figured by H. & A. Adams, in their "Genera of Recent Mollusca," plate LXXXIV., fig. 8. From the tenuity. and other general characters of the shell. as well as the want of an operculum. the genus was rightly presumed to belong near the Limnacidæ, and to be nearly allied to *Ancylus*.

* For the cuts which form the illustrations of these "Notices," I am indebted to the liberality of the Smithsonian Institution.

The Cuban shell was named *Gundalachia Ancyliformis*, and is the subject of interesting articles by Bourguignat in the Revue et Magasin de Zoologie, 1855, p. 23, and 1862, p. 13. A second species *G. Hjalmansonii*, from Honduras, has since been described by Dr. Pfeiffer. (Zeitsch. für Malak., 1852, pp. 179–84; and Malak. Blatter, V. 196.) M. Bourguignat, in the latter of the two articles above quoted, has described two additional species from Cuba, *G. Poeyi* and *G. aderosia*, and in the Proceedings of the California Academy of Natural Sciences, for April of the present year, Mr. Rowell has described and figured a fifth species, *G. Californica*, from the waters of the Feather River, of which a cut is here offered (fig. 1), copied from Mr. Rowell's figure.

FIG. 1.

In the spring of the present year, I have discovered a sixth species in the vicinity of Washington, D. C. The genus is thus, as far as known, peculiar to North America and confined to the tropical and warm-temperate regions.

I have taken the opportunity afforded by the occurrence of the last-mentioned species, to study the lingual dentition of the animal and the mode of growth of the shell in this curious genus. The species may be called

GUNDLACHIA MEEKIANA.

FIG 2.

The full-grown shell, in general form, is ovate. It is much broader than in *G. Ancyliformis*, and has a less ovate aperture than in *G. Californica*, as may be seen by comparison of the figures.

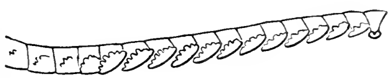
The shell consists of two distinct parts, and from above looks very much like a small and thick, black *Ancylus*, sticking obliquely and to the right upon the posterior end of the back of a larger thin and whitish one. These two parts we will call, for convenience, respectively the smaller shell and the larger shell. The two parts nearly resemble each other in outline, each being oblong, roundedly truncate before, and narrowed and somewhat obliquely truncated behind, the right posterior angle being prominent.

The dorsal part, or smaller shell, as before stated, is black opaque, and comparatively thick. It is about one-third as long as the larger shell, and has the usual form of a young *Ancylus*, the very obtuse apex being at the posterior third of its length and inclined to the right. Anteriorly it is continuous with the dorsum of the larger shell, but posteriorly it projects freely over and beyond the margin of that shell at its posterior dexter angle, to a distance equalling rather less than a fourth of its own length. Inferiorly, the entrance of this projecting portion of the smaller shell is closed by a flat septum, extending from margin to margin, and continuous anteriorly with the dorsum and internal shelf of the larger shell presently to be described

The larger shell is thin, translucent, presenting signs of rapid growth, and usually of a whitish or very pale horn color. It is more expanded to the left than to the right, the dorsum and left slope being strongly convex, while the right slope is nearly straight. It is marked with prominent striæ of growth, and indistinct radiating lines. Within, at the narrower posterior end, there is a rather strong white shelf, formed by the soldering of the dorsum of the larger to the septum of the smaller shell, which extends forward and upward, nearly to the bottom of the concavity, leaving, however, an aperture which leads into the cavity of the smaller shell, in which the liver of the animal is seated. This aperture is exactly semi-lunar in shape, its longer diameter being of course coincident with the width of the smaller shell, and equalling about one-third that of the larger shell. In younger specimens the shelf is a little less extensive, and the apicial aperture somewhat larger.

The soft parts of the animal, except in the form of the visceral sack, agree so closely with those of true *Ancyli* that I have not succeeded in finding any differences of importance. I add here a figure of its lingual dentition. This resembles very nearly that of a species of *Ancylus* common in the District (which appears to be the *A. rivularis* of Say and Haldeman), differing from it only in having two or three teeth less in number, and in the more numerous denticles with which its lateral teeth are armed.

FIG. 3.



After a close examination of the above characters, I have ventured to suggest that the *Gundlachia* commences its life as an *Ancylus;* the smaller shell, in which the earlier period of its life is spent, being undistinguishable in form from the shells of that genus. It is probable that it passes the first summer and autumn of its existence in this smaller shell and that the septum which afterwards partially closes its aperture is formed during the period of inaction, which ensues during the winter.*

* It has now reached the state in which *G. ancyliformis* was originally described by Pfeiffer, in 1849, and which was then thought to be the adult form.

In making the above remarks, I am well aware that Bourguignat, in the *Revue et Magasin de Zoologie* for 1862, p. 19, asserts that this septum, or "inferior lamella" exists in the young *Gundlachia ancyliformis* from the date when it leaves the egg, and says that he has even been able to verify this as a fact. Without wishing to throw doubt upon so positive a statement, I may be permitted to sug-

This septum would in some degree serve as a protection to the Mollusk during this period, in the same way as the epephragm of the Helices.

In the following spring, — the period of greatest activity in growth with all the fresh-water Pulmonates, — the animal throws forth its newer and larger shell, retaining the older one on its back for the protection of its more tender viscera. It therefore will be a matter of great interest and importance to observe these animals in the latter part of winter, when the formation of the newer shell is about to commence. At that period, they will be found to present the primary form, namely, that of an *Ancylus* with two-thirds of its aperture closed by a septum, leaving but a small opening for the egress of the foot of the animal.

This remarkable little Mollusk, of a genus new to our Fauna, has occurred to me in one locality only, —a small pond of clear water, in a marshy bank of the Potomac, on the northern side, between Georgetown and the Little Falls in one direction, and between the canal and the river in the other. The pond is about one mile below the so-called "Chain Bridge." Five specimens only were found, after repeated search.

I have dedicated this species to my friend, Mr. F. B. Meek, the most accurate of American investigators in Fossil Conchology, the pleasure of whose company I enjoyed during several excursions for the purpose of procuring specimens of it.

The Secretary read a communication by Dr. James Lewis, of Mohawk, N. Y., on the identity of *Paludina subglobosa* Say with *Melania isogona* Say.

Dr. Wyman stated that he had recently observed the

gest a careful repetition of the observation. For if the young animal when hatched has a septiferous shell, of the same form as at the period when the newer shell is about to be thrown off, it is difficult to conceive how its enlargement by growth in the first season is effected. Shells increase in size by additions to the margin of their aperture, but such additions to the lips of the little semi-circular aperture of the young *Gundlachia* would simply close it up entirely. The alternative — that the shell when hatched has already reached the size (one-eighth of an inch in length) seen in the immature septiferous individuals, and that they increase no more until the larger shell is thrown off — would seem to be contrary to all that we know of the earlier condition and growth of other genera of the family, such as Ancylus. I should mention, however, as an argument in favor of Bourguignat's view, that I have been unable to detect distinct lines of growth upon the superior portion of the shell; but, on the other hand, there are very distinct lines of growth upon the *septum*, which would indicate that that portion of the shell at least was formed after the birth of the animal, for such lines of increase are not seen in shells formed in the egg. The specimens first found in Cuba, which, as before-stated, were immature and septiferous, occurred in a dried-up pond, the dry season in that climate corresponding in its effects upon Mollusks, as well as in time, to our winter.

mode of impregnation of the ova of the common Bream (*Pomotis auritus* Raf.) upon the shores of Fresh Pond. The females are seen swimming in a circle around a hollowing in the sand, from which they move only to dart upon some intruder, and when joined by the male they swim together in a similar manner side by side, the male occasionally turning half way over so as to move with the flat side of the body in a horizontal position, having the abdomen turned toward the female; the female at the same time executes a similar movement, though not assuming quite so horizontal a position, and in this attitude, with their abdomens toward one another, the impregnation is effected.

Mr. A. E. Verrill, presented, on behalf of Mr. Geo. H. Emerson, a paper entitled "Observations on Crystals and Precipitates in Blowpipe Beads;" and two by himself, namely: "Synopsis of the Halcyonoid Polyps collected during the years 1853–6, by Wm. Stimpson, Naturalist to the North Pacific Exploring Expedition, commanded by Captains Ringgold and Rodgers," and the following: —

NOTICE OF THE EGGS AND YOUNG OF A SALAMANDER, DESMOGNATHUS FUSCA BAIRD, FROM MAINE. BY A. E. VERRILL.

The eggs of our Salamanders, except those of *Plethodon erythronotus*, which were observed last year by Mr. Putnam,* are as yet very little known, as well as their habits during the breeding season and the development of the young. While on a short excursion to Maine during the present season, I was fortunate enough to find the eggs of *Desmognathus fusca* Baird (Salamandra quadrimaculata Holb.) near the town of Norway, and after communicating the fact to Mr. S. R. Carter of Paris Hill, he also found more of the eggs under precisely the same circumstances, and at the same time caught a large number of the young of previous years, which are of interest for illustrating its mode of growth. This salamander occurs quite commonly in Maine in cold, rapid, rocky brooks and springs, or under stones close to their margins, where it is very damp and cool. The eggs were first found on the 20th of May, in a little brook near Norway village, and appeared then to be freshly laid. They were attached in a cluster to the lower surface of a flat stone cov-

* These Proceedings, p. 173.

ered by the water. There were forty eggs of rather large size, each one adhering quite strongly to the rock, but only in contact with the other eggs, and without any mucus investing the whole cluster like that of most frogs and toads.

The yolk of the egg is white, like ivory in lustre, and about one-tenth of an inch in diameter; the surrounding substance is perfectly colorless and transparent and about one-quarter inch in diameter. In these eggs the embryos were distinctly formed by the first of June; but those collected by Mr. Carter on the 29th of May were newly laid. With the latter were found young ones in two well-marked stages of growth, all of them with external gills. These will represent those of the two preceding years, unless this species breeds twice during the season, which is not probable. The smaller ones vary from nine-tenths to one and one-tenth of an inch in length, and have a broad, flat tail, scarcely tapering, truncate at the end; the feet are well formed. The larger ones are from one and seven-tenths to one and nine-tenths of an inch in length, and have a flattened, tapering tail, well-developed external gills, and all the markings commonly found on the adults, which are three or four inches long, and have tails much longer, in proportion, tapering to a slender point. With a large number of these two sizes, there is a single one intermediate between them. This is one and three-tenths of an inch in length, and is very likely only a somewhat smaller individual than usual of the larger sized form, but this can be definitely determined only by a greater number of specimens.

From what has already been ascertained, however, there can be but little doubt that the external gills remain two years and that the adult size is not attained before the third year.

This species differs, therefore, very remarkably from *Plethodon erythronotus*, both in the manner of laying the eggs and in the development of the young; for in the latter the young, as observed by Mr. Putnam, lost their external gills in less than three days from the time they were hatched, and probably attain their adult size during the first year.

The only previous notice of the eggs of this species that I have been able to find, is a remark by Prof. Baird, that the eggs are "wrapped around the body of the female, who remains in a damp spot until they are hatched." This habit is entirely different from what I have observed, and, in connection with the great differences in the color and other characters of specimens from different localities, referred to this species, would indicate that two or more species have been confounded under one name. It is possible that the observation of Prof. Baird applies to the form recently described by

Mr. E. D. Cope, as a distinct species, under the name of *Desmognathus ochrophœa*.*

Amblystoma punctatum Baird. This species was found in a pool of water, at Norway, by Mr. S. I. Smith, on the 3d of May. It is probable, therefore, that it deposits its eggs in water about that time.

The following letters were read, which had recently been received, namely: —

From the Naturhistorischer Verein, Bonn, January 17th, acknowledging the receipt of the Society's publications; the K. Akademie der Wissenschaften, Wien, January 24th, 1863, presenting its publications; Mr. Temple Prime, April 13th, and Dr. Eugene P. Robbins, April 20th, acknowledging their election as Corresponding Members.

Mr. C. C. Frost, of Brattleboro', Vt., was elected Corresponding Member.

Mr. C. B. Porter, of Boston, and Mr. Thos. P. Ritchie, of Brookline, were elected Resident Members.

DONATIONS TO THE MUSEUM.

April 1. *Lithodes arctica*, from Rockport, Mass., by Mr. Addison Gott. A pair of *Nyctea nivea*, from McGregor, Iowa, by Mr. H. Davis.

April 15 A hair-ball from the stomach of an ox, by Mr. Francis H. Jackson. *Storeria Dekayi*, from Newport Harbor, by Dr. B. Joy Jeffries.

May 6. A bottle of snakes and salamanders, by Miss E. Richardson. Two Japanese Dogs, by Dr. Ruschenberger, U. S. N. A box of Mollusca, from North Carolina, by Dr. B. S. Shaw.

May 20. Specimens of calcareous tufa, from Wisconsin, by Mr. J. White.

June 3. Live specimens of *Pituophis melanoleucus*, from Manchester, N. J., by Mr. T. J. Whittemore.

June 17. An electrical eel (*Gymnotus*), from the Amazon, by Mr. Thomas Hall.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1863.

Proceedings of the American Antiquarian Society. 8vo. Pamph. 1863. *From A. A. Society.*

Annual Report of the Mercantile Library Association. 8vo. Pamph. New York, 1862–3. *From M. L. Association.*

Constitution and By-Laws of the Natural History Society of Montreal. 8vo. Pamph. Montreal, 1859. *From Major L. A. Huguet-Latour.*

Field and Garden Vegetables of America. By Fearing Burr, Jr. 8vo. Boston. *From Hon. Albert Fearing.*

* Proceedings Phil. Acad. Nat. Sciences, 1859, p. 124.

Report of Commissioner of Patents for 1861. 8vo. Washington. *From the Commissioner.*

Notice of New Species of Fossils in Indiana. By Prof. James Hall. 8vo. Pamph. Albany, 1862. *From the Author.*

Description of Specimens of Fossil Reptilia. By Dr. J. W. Dawson, F. G. S. 8vo. Pamph. London, 1862. *From the Author.*

Catalogue of Birds found at Norway, Oxford County, Maine. By A. E. Verrill. 8vo. Pamph. *From the Author.*

Salt Manufacturers of the Saginaw Valley, Michigan. 8vo. Pamph. *From the Author.*

Ueber das Ende der Wirbelsäule der Ganoiden und einiger Teleostier. Von A. Kölliker. 4to. Pamph. Liepzig, 1860. *From the Bailey bequest.*

De la Connaissance des Fruits et des Graines. Par M. Charles des Moulins. 8vo. Pamph. Bordeaux, 1862.

Quatre Memoires. (Botaniques.) Par M. Ch. des Moulins. 8vo. Pamph. Bordeaux. *From the Author.*

Note sur le Sisymbrium Bursifolium. Par M. Ch. des Moulins. 8vo. Pamph. Bordeaux, 1845.

Catalogue raisonné des Phanérogames de la Dordogne. Par M. Ch. des Moulins. 8vo. Pamph. Bordeaux, 1859.

Etudes Organiques sur les Cuscutes. Par M. Ch. des Moulins. 8vo. Pamph. Toulouse, 1853. *From C. J. Sprague.*

List of the Butterflies of New England. By Samuel H. Scudder. 8vo. Pamph. 1863.

Black River Copper Mining Company: Geological Survey and Report. By Dr. C. T. Jackson. 8vo. Pamph. 1862.

Wickham Copper Mining Company: Geological Survey and Report. By Dr. C. T. Jackson. 8vo. Pamph. 1862. *From S. H. Scudder.*

On the Different Types in the Microscopic Structure of the Skeleton of Osseous Fishes. By A. Kölliker. 8vo. Pamph.

Ueber Kopfkiemer mit Augen an den Kiemen. Von A. Kölliker. 8vo. Pamph.

Ueber den Bau der Säge des Sägefisches. Von A. Kölliker. 8vo. Pamph.

Ueber die Beziehungen der Chorda dorsalis zur Bildung der Wirbel der Selachier und einiger andern Fische. Von A. Kölliker. 8vo. Pamph. 1860.

Ueber den Antheil der Chordascheide an der Bildung des Schädelgrundes der Squalidæ. Von A. Kölliker. 8vo. Pamph.

Ueber die Entwicklung des Geruchsorganes beim Menschen und beim Hühnchen. Von A. Kölliker. 8vo. Pamph.

Der embryonale Schneckenkanal, etc. Von A. Kölliker. 8vo. Pamph.

Ueber die grosse Verbreitung der "perforating fibre" von Sharpey. Von A. Kölliker. 8vo. Pamph. *From the Author.*

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Wiener Entomologische Monatschrift. Band VI. 8vo. Wien, 1862.

Die Noctuinen Europa's. Von Julius Lederer. 8vo. Wien, 1857.

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Proceedings of the Royal Horticultural Society. Vol. III. Nos. 1–4. 8vo. Pamph. London, 1863.

Notices of the Proceedings at the Meetings of the Members of the Royal Institution of Great Britain. Part XII. 8vo. Pamph. 1861–2. London.

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July 1, 1863.

The President in the chair.

Mr. A. E. Verrill made the following observations on the supposed eastward migration of the Cliff Swallow (*Hirundo lunifrons* Say).

The interesting history of this swallow, and the peculiar circumstances connected with its first discovery in the west and subsequent appearance in the Atlantic States, are so well known that it is perhaps unnecessary to present at this time more than a brief summary of the recorded observations of its earliest appearance on the eastern side of the continent.

In 1815, they were observed at Henderson, Ky., on the Ohio River, by Mr. Audubon; in 1817, a colony, then two years old, was seen by him opposite Cincinnati. In 1817, they are said by De Witt Clinton to have appeared at Whitehall, N. Y.,— the first year in a single pair, which in 1822 had increased to seventy. In 1820, it was discovered among the Rocky Mountains by Major Long's Expedition, and also by Sir John Franklin's party between Cumberland House and Fort Enterprise.

Sir John Franklin states that in 1825 they made their first appearance at Fort Chippewyan, building their nests under the eaves of a building. Dr. J. W. Steel mentions them as breeding at Greenfield,

N. Y., in 1825, and near Lake George in 1829. In 1830, they were mentioned by Mr. S. Woodruff as breeding in numbers at Windsor, Ct., and also, according to Dr. T. M. Brewer, at Winthrop, Me., by General Dearborn. Dr. Brewer * speaks of them as breeding at Coventry, Vt., in 1837, and at Jaffrey, N. H., in 1839. Prof. S. F. Baird first notices them at Carlisle, Pa., in 1841. At about this period, they seem to have become common in Massachusetts, but are well known to have been common some years earlier in Maine, New Hampshire, Vermont, and Northern New York.

My attention having been drawn to this subject by the discovery, in 1861, of a large colony of these birds breeding on the high limestone cliffs of Anticosti, apparently in their original condition, and entirely removed from the abodes and influence of man, it became an interesting subject of inquiry to ascertain whether any information could be obtained of their early occupation of the northeastern part of Amerca. In this way I hoped to be able to judge, to a certain extent, whether this species was originally indigenous in that part of the country, breeding in such localities as would furnish suitable limestone cliffs for the support and preservation of its nests, or whether, in its assumed eastward migrations, it had first forsaken its native haunts on the cliffs of the West for the safer and more congenial sites found upon the buildings of man, and, advancing still further east, across a country abounding in buildings suited to its wants, it had afterwards forsaken its acquired habits and gone back to breed upon the remote and lonely cliffs of Anticosti.

In pursuing this investigation, I have been surprised by the amount of evidence that has constantly accumulated to prove that this swallow was well known in the interior and northern parts of Maine, *as early as or earlier than its first discovery anywhere in the West.* A very large proportion of the aged farmers who have been to any extent observant of such facts, when questioned concerning this species (which is well known to them as the "Eaves Swallow," no other species having the habit of building its nests in the same way), mention its singular habits as one of the early recollections of their boyhood. Many of them, though not able to fix upon any precise date when they first saw it, feel sure that it was not later than 1812 or 1815, and some have given much earlier dates.

The reliable testimony of two or three trustworthy persons ought, however, to be sufficient to establish so obvious a fact as this must necessarily have been. To this end I have selected the following statements: —

Aaron Shackley, Esq., of Norway, Me., an aged gentleman, remark-

* *North American Oölogy*, page 96. (*Smithsonian Contributions*, Vol. XI.)

able for the clearness and accuracy of his memory, as well as for his habits of close observation, states that the Eaves Swallow commenced to breed on his father's barn at Wells, Me. (now Kennebunk), in 1804, two years before his removal from that town, which was in 1806.

Dr. J. W. Steel * states that "In 1800, I first noticed a colony of these birds at Union, in Maine; their nests were constructed of mud and occupied the entire front of a long barn, filling the space under the eaves."

Mr. G. A. Boardman, well known as an observing ornithologist, informs me that when he removed from Massachusetts to St. Stephens, N. B., in 1828, his attention was at once attracted by these swallows, which he had never seen before, breeding in abundance, and was told that they were nothing new there.

From these facts it seems that since this bird was not discovered anywhere in the West before 1815, we have no reason whatever to suppose that its migration proceeded from west to east, or that it did not originally belong as much to the eastern as to the western part of the continent. That it has, within a comparatively recent time, extended its range to southern New England and as far south as Pennsylvania along the Atlantic coast, is undeniable; but it seems to me equally probable that it advanced from the north, or northeast, southward, as from the west eastward. The opinion to which I am most inclined, after considering all the facts hitherto collected bearing upon the subject, is that when this continent was first settled by Europeans, the Cliff Swallow inhabited the whole of its breadth wherever there were extensive limestone cliffs suitable for the building of its nests; and that as civilization advanced toward its native haunts, and suitable buildings became accessible to it, it gradually abandoned the cliffs, and, increasing in numbers to a greater extent than before, on account of the protection invariably furnished it by man, it gradually spread over New England and the other northern States, where hitherto there had been no cliffs suited to its wants. In thus extending its range, it probably advanced both from the western and from the northeastern parts of the country, both these regions abounding in high limestone cliffs, which are entirely wanting in New England.

This view also seems more in accordance with the known changes in the habits and range of our other species of swallows.

The following paper was presented: —

* *American Journal of Science*, Vol. XIX., 1831, p. 356.

DESCRIPTION OF TWO BIRDS FROM THE BAHAMA ISLANDS, HITHERTO UNDESCRIBED. BY HENRY BRYANT, M. D.

PITANGUS BAHAMENSIS.

Syn. *Tyrannus caudifasciatus*. Bry. *Proc. Bost. Soc. Nat. Hist.*, Vol. VII., p. 108.

Dimensions. (Adult ♂.) Length, .203.* Length of wing, from flexum, .107; tail, .081; first primary .014 shorter than the third, which is the longest; second and fourth equal, and .002 shorter than third. Tail nearly square, the outer feathers .004 shorter than the central ones.

Color. Bill, dark horn, nearly black on the upper, and slightly lighter on the lower mandible. Upper part and sides of head, including the eyelids and ear-coverts, and extending on to the nape, dark-brown with a very faint tinge of olive; the forehead and lores ashy and a concealed spot of bright orange-yellow on the vertex. Hind neck, scapulars, back rump, and upper tail-coverts, ashy, with an olive tinge, scarcely to be seen on the the neck, and with the margins of the tail-coverts dull ferruginous. Tail above, dark, slightly purplish-brown, with the tips of all the feathers lighter. Those of the central ones nearly white, and the outer web of the outer feathers pale olive-brown. Wings wood-brown, with the margins of the outer webs of all the quills, and of the greater and middle coverts lighter; very slightly so on the first primary and narrow portions of the outer one, and very conspicuously so on the greater coverts, secondaries, and tertiaries, where they are quite white. Throat soiled white. Fore neck and breast, pale ashy. Abdomen, flanks, crissum, and tibiæ, pale yellow, shaded superiorly into the ashy of the breast. Tail beneath, wood-brown, with the tips of the feathers lighter, and the outer web of the outer feathers pale olive-brown. There is a concealed white bar at the base, formed by a spot on the inner webs of all the feathers, largest on the outer one, of which it occupies nearly two-fifths of the length. Under surface of wing, light wood-brown, with the outer webs of all the quills broadly margined with whitish, extending about half the length from the base of the first, and farther on the other, so as on this to occupy nearly the whole length. Axillaries and under-wing coverts, pale yellow, with the centre of some of the coverts, principally those of the greater ones, brown. Tarsi, toes, and claws, black.

It is readily distinguished from P. caudifasciatus by the yellow of the crissum and abdomen.

* The measurements are in parts of a metre.

Saurothera bahamensis.

Syn. *Saurothera vetula*, Bry. *Proc. Bost. Soc. Nat. Hist.*, Vol. vii., p. 106.

Dimensions. (Adult ♂.) Length, .490. Length of wing, from flexum, .162. Length of tail, .258; Bill, along ridge, .048, from gape to tip of lower mandible, .055. Depth at base, .013; breadth at base, .009. Sixth and seventh quills equal and longest. Outer tail feathers .105 shorter than central ones.

Color. Bill, pale brown, with the base and culmen dark. Head above, hind neck, back, scapulars, and rump, ashy, with a slight vinaceous tinge, and a faint bronzy lustre on the scapulars, and with the shafts and terminal bristles of the feathers of the forehead, black. Wings, bronzed ash, with slight metallic reflections, and with the base of the primaries, dull rufous, gradually shaded into the ashy of the rest. Upper tail coverts, and tail above, bronzed ash, like the wing, with a narrow terminal white and broader subterminal black bar on all the tail feathers. Throat, fore neck, and breast, pale, slightly vinaceous ash, darkest toward the abdomen, and on the sides, where it is gradually shaded into the darker color of the upper parts. Abdomen, flanks, crissum, and tibiæ dull rufous, gradually shaded into ashy from the crissum to the breast. Under surface of tail pale wood-brown, with the white and black bars as above. Under surface of wings pale, slightly bronzed brown, with the centre rufous, rather abruptly shaded into brown toward the tip, and sides, and anteriorly very gradually into the pale fawn of the inner coverts, which is lightest toward the bend of the wing. Tarsi, toe, and claws, dark bluish horn, the edges of the scales, whitish, and the soles of the feet dirty flesh-color.

Since writing the article on the Bahama birds, in which this was given as S. vetula, I have had an opportunity of examining all the described species, and find that the present species is very distinct.

The following letters were read, which had been recently received, namely: —

From Edward Tuckerman, Amherst, Mass., May 8; Charles E. Hamblin, Waterville, Me., June 20; and Baron Osten Sacken, New York, June 24, in acknowledgment of their election as Corresponding Members; the Royal Dublin Society, April 2; and the K. Gesellschaft der Wissenschaften zu Göttingen, May 7, acknowledging the receipt of the Proceedings of the Society.

Mr. Charles H. Hitchcock, of Amherst, was chosen a Corresponding Member, and Lieut. Samuel W. Powell, of the Marine Corps, U. S. A., a Resident Member.

September 2, 1863.

The President in the chair.

In answer to a question from Mr. Sheafe, a statement was made by Dr. B. J. Jeffries, of the Building Committee, relative to the condition of the new Building. Dr. Jeffries thought it would be ready in October.

September 16, 1863.

The President in the chair.

A communication from Elliott Coues, of Mount Pleasant Hospital, Washington, on the Osteology and Myology of Colymbus, was received and referred to the Publishing Committee.

Dr. J. Wyman gave an account of some observations which he had recently made on an Amœba.

The species referred to appeared in some fibrine, which had been confined between two plates of glass, for the purpose of watching the progress of its decomposition in water. The Amœbæ were first noticed as minute points, and gradually grew to full size, without any obvious change of form or structure. As seen under the microscope, they appeared to be made up of a spherical sarcodic mass, which was structureless, and in which were imbedded numerous granules, from which last, however, a portion of the circumference of the organism was wholly free. Solid bodies, lodged in the interior, were seen to be discharged at various points in the circumference, seeming to meet with little or no obstruction, and yet no *opening* was discovered at any point. When the body to be discharged came near the surface, the sarcode was pushed out before it, becoming more and more prominent outwards, and at length broke like a bubble, leaving the contained body free.

The Amœba, in one instance, underwent complete spontaneous division in five minutes; first taking on the shape of a dumb-bell, then the two principal masses receded from each other, the band which united them became thinner, and finally broke, just as does the thread which unites two viscid bodies when drawn apart, and two complete Amœbæ were formed. In another instance, the division had become nearly complete, as just described, but the two masses, instead of separating wholly, again approached each other, and nearly recovered their original shape.

From the manner in which solid particles pass through these structures, and the rapidity with which the whole organism becomes subdivided, it is reasonable to infer that they have no proper integument, especially as the microscope fails to reveal such a structure.

Professor Henry James Clark said that Actinophrys was particularly interesting, as manifesting a step higher than the simple homomorphous organization of Amœba, as described by Prof. Wyman. Prof. Clark referred to Kölliker's observations in 1849, as recorded in the Zeitschrift für Wissenschaftliche Zoölogie, and showed that, even supposing Kölliker to be correct, the division of the mass of the body into an exterior and interior portion, the former containing much larger vacuoles than the latter, indicated a heteromorphous organization, and tending toward specialization of parts. He also added that he could not agree with Kölliker, that Actinophrys is a homomorphous mass with vacuoles, but that he was convinced that the so-called vacuoles of the outer and inner layers, are true cells, with a distinct wall about them: a wall that could be easily recognized with the help of the better sort of microscope objectives of the present day. Owing to the exceeding transparency of the organism, no ordinary objective will show the walls; but, with a one-quarter inch lens, of one hundred and fifty degrees angular aperture, made for him, last June, by Tolles, of Canastota, N. Y., he had no difficulty in working, with the proper adjustment and corrections, through a sufficient depth of water to completely cover the Actinophrys (A. Eichornii), and could readily detect the walls, not only of the superficial cells, but also of the innermost ones.*

* The unprecedented working distance, which accompanies the great angle of aperture in the above-mentioned lens, prompts me to speak more fully of its excellence. It has been the chief desideratum of naturalists to obtain a large increase in the working distance of those lenses which have a great angle of aperture; but, hitherto, the latter condition has seemed to involve necessarily an excessively short working distance, and consequently great inconvenience in the investigation of all bodies which are not correspondingly thin. The idea of studying marine animals in their native element, with such lenses, could never be indulged in, for fear of ruining the objectives, by contact with salt water. At last, we are relieved from this restraint, for within the last four or five years a great improvement has been made in this respect by opticians, at least by Mr. Tolles. The most recently constructed lens which I have received from that gentleman was made last June; it is a one-quarter inch objective, with an angular aperture of *one hundred and fifty degrees*, and a most unexpected working distance of *one-fiftieth of an inch* for uncovered bodies. By experiment, I also find that it works through a glass covering, fully *one-fortieth of an inch thick*, and with some room to spare above that. The working distance through water I have not measured accurately; but that can be inferred from the difference between its refraction and that of glass. The defining power of this lens is certainly unsurpassed, if not unequalled.

What is remarkable, too, the pseudopodia, as frequent and careful observations have led him to determine, invariably alternate with the cells of the exterior layer: that is, they are prolongations of the intercellular amorphous substance of the body. This fact would seem to add to the proof that the so-called vacuoles are really cells; otherwise it would be hardly credible that simple vacuoles, which come and go in an amorphous substance, should always alternate with the pseudopodia.

Sometimes, a pseudopod moves very rapidly, especially when it has seized upon some victim, for then it retracts with a sudden jerk, and draws the prey close to the body, which finally engulfs it, in the same manner as does Amœba. The pseudopodia exhibit an adhesive power, which is remarkable when we consider the size of the animals which are sometimes drawn in by them, and, in this respect, remind one of the "adhesive vesicles" in the anchors of Lucernariæ, which hold fast to bodies with the greatest tenacity, and, to all appearances, by simple contact, just as glue and mucus adhere to anything which touches them. (See my paper on "Lucernaria, the Cœnotype of Acalephæ." *Proc. Bost. Soc. Nat. Hist.*, Vol. IX., 1862, p. 52; and also, reprinted, "with additions and notes," in *Silliman's American Journal of Science*, for May, 1863, p. 352.) In a Difflugia (very near D. proteiformis), Prof. Clark had observed that whenever the pseudopodia contract, they invariably become strongly wrinkled transversely; and, as he could not detect the least trace of an envelope, or wall-like layer, on this part of the body, he believed that the wrinkling is peculiar to the substance of the pseudopodia.*

* In this connection, I will take the opportunity to assert, that, from a number of observations on various animals, I have been led to the conclusion that *all vibratile cilia originate in the amorphous intercellular substance.* In no instance have I ever seen vibratile cilia forming direct prolongations of cells; but invariably I find their bases imbedded in the intercellular cytoblastema. They may seem to be prolonged from the underlying cells, but, on the contrary, as I have particularly satisfied myself, in regard to the branchiæ of the oyster, Ostrea Virginiana, they are based in the cytoblastema, which extends in a thin stratum over the outer ends of the cells. In other instances, they alternate with the cells, projecting in rows between them, and forming, as it were, a bristling corona to each cell, as I have seen in the epithelium of the intestine of the young snapping-turtle, Chelydra serpentina. In the latter instance, when the cells are loosed from the intestine, they carry the overlying cytoblastema with them, and consequently, also, the vibratile cilia, which then falsely appear like appendages of the cells themselves. The nettling cells, *cnidæ*, of Polypi and Acalephæ originate in the same substance, the intercellular cytoblastema, as do vibratile cilia. They have been supposed to *develop within the cells* of the layer in which they are situated; *but this is not true.* Oftentimes, when cnidæ are removed from their basis by pressure, they drag along with them a portion of the cytoblastema, which encloses them like a transparent envelope, and has the appearance of a cell. Sometimes three or four cnidæ are pressed out together, and, being covered by the accompanying cytoblastema, they present the deceptive appearance of several cnidæ, in one cell.

There are four periods in the history of Cnidæ. Wagner (*Wiegm. Archiv*, 1853)

Mr. F. W. Putnam gave an account of some peculiarities he had noticed in humble-bees.

was the first to detect the existence of these bodies; but he mistook them for peculiar forms of spermatozoa of Actinia cereus. Immediately after this, if not at the same date, Ehrenberg (*Abhandl. Berlin Akad.*, 1835. *Jahrg.* [1837.] p. 147) recognizes their true office, and describes them as the prehensile organs, "Fang Angeln," of Hydra. Yet, in 1842 (*Wiegm. Archiv*), we find him inclined to deny that they have the *stinging* properties, such as Wagner attributes to those which he found in Pelagia noctiluca. In 1841 (*Wiegm. Archiv*, p. 38), Wagner describes the nettling organs, "Nesselorgane," of Pelagia noctiluca, and, although he detects the spirally-rolled thread in the capsule, and says of the thread, "sometimes it appears as if it had a canal," and figures it so in his *Icones Zoötomicæ*, 1841, Pl. 33, fig. IX., B, yet it was reserved for Doyère, in the latter part of the next year (*Compte Rendu*, *Aout.*, 1842, p. 429. "Note sur quelques points de l' anatomie des Hydres d' eau douce"), to describe the mechanism of the Cnidæ, and the mode of evolution of the thread, with such completeness as to anticipate everything, in this regard, that has been published since, up to the year 1860, when I figured and briefly pointed out (in *Agassiz's Contributions*, Vol. III., Pl. XI.[b], fig. 16[a], Aurelia flavidula, and description of plate p. 17; and Pl. XI.[c], fig. 5, Coryne mirabilis) an as yet undescribed relation of the thread to the cell in which it is coiled up. As the brilliant discovery of Doyère has been kept in comparative obscurity, at least in this country, I will quote from his paper such passages as will make it clear that he deserves the credit which has been assumed by those who have merely *repeated his observations*. On page 430, *Compte Rendu*, he says, "Ainsi le *spicule* ou *dard*, figuré dans l' intérieur du sac par M. Corda (*calcarea sagitta*, Corda), et représenté saillant au dehors par M. Ehrenberg, dans sa planche, II., fig. 7 b, n'est autre que l' espèce de calice basilaire à trois point en étoile, des prétendus hameçons. Le long filament grêle qui part de ce calice étoile était, avant l' evolution, invaginé en dedans de lui-même et du calice ou spicule par un *retournement en doigt de gant*, et formait au fond du sac cette apparence de coussin que M. Corda a nommé *vesica patelliformis*; un examen attentif et d' excellents instruments font même reconnaître dans ce coussin sa composition par un fil enroulé en spirale." On page 431, he speaks of the evolution of the thread of this, and another smaller nettling-cell, by *ensheathing itself*, "des corpuscules plus petits et surtout beaucoup plus étroits que les précédents, ovoïdes, à parois épaisse contenant à leur interieur un fil enroulé en spirale, qui sort comme le long filament des hameçons, en s'engaînant en dedans de lui-même." All that I have been able to add to this, although the subject has been pursued with the utmost rigor, and with the best lenses to be had, is the description of the relation of the coiled thread to that part of its base which projects straight into the cavity of the cell. Perhaps the greatest importance that can be attached to this is that it is the most difficult to make out. However, the discovery of this feature solves the whole mechanism of the organ. Although I had, in 1860, figured and briefly indicated (*Agassiz's Contrib.* ut supra) this part of its structure, yet it was not until the fourth volume of the Contributions appeared, in 1862, that I described it in full, as I had seen it in various animals, viz., in the ephyra of "Aurelia flavidula," p. 44; the hydraform of "Coryne mirabilis," p. 209; "Actinia marginata," p. 210; and "Hydractinia polyclina," p. 237. At first sight, I might seem to be anticipated in this by Gosse, in his *Evenings with the microscope*, London, 1859, or in his *Actinologia Britannica*, London, 1860, p. XXIX. introduction, and Pl. XI., fig. 6; but, upon examination of his illustration, I find nothing to justify it; and, from his description in connection with the figure, I would judge that the Cnidæ had been injured and distorted by pressure. However, I leave it to others to judge whether Gosse's description is sufficient to clear up the subject in this regard.

Among the Ctenophoræ, the cnidæ are so numerous, and so closely packed together, as to form a uniform layer all over the surface of the tentacle totally outside of the exterior wall.

Prof. J. R. Willis, of Halifax, N. S., was elected a Corresponding Member.

Dr. George B. Windship was elected a Resident Member.

DONATIONS TO THE MUSEUM.

July 1. *Conocepalites*, from Braintree, by Dr. W. E. Rice. Collection of mosses from Sandwich Islands, by Dr. Ruschenberger.

September 2. Eggs of pigeon-woodpecker, king-bird, and barn-swallow, from Cohasset; invertebrates in alcohol, and eggs of *Trachemys serrata* Ag. from Newbern, N. C., by Dr. S. Kneeland. Shell conglomerate from Ascension Island, by Rev. C. F. Barnard.

September 16. Specimens of a *Lygæus*, which feeds upon insects, by Dr. J. C. White. Hydroid Polyps from Martha's Vineyard, by Mr. Merriman. Insects from the Bermudas, by Mr. S. N. Chamberlain.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPT. 30, 1863.

Letter to J. Barrande, on the Rocks of the Quebec Group, by Point Levis. By Sir W. E. Logan. 8vo. Pamph. Montreal, 1863. *From the Author.*

Flora Australasica. By Robert Sweet, F. L. S. 8vo. Pamph. *From Dr. E. Jarvis.*

Second Annual Report of the Natural History and Geology of the State of Maine. 8vo. 1863. *From C. H. Hitchcock.*

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

Scientific Men. (Portraits.) Folio. *From Theodore Lyman.*

System der Thierischen Morphologie. Von Dr. J. Victor Carus. 8vo. Leipzig, 1853.

Jahrbuch der k. k. geologischen Reichsanstalt. 12 Band; No. 4. 13 Band; No. 1. 8vo. 1862–3. Wien. General Register. 8vo. Pamph. Wien.

Correspondenz-Blatt des zoologisch-mineralogischen Vereines in Regensberg. No. 12. 16 Jahrgang, 1862.

Zwölfter Jahresbericht der naturhistorischen Gesellschaft zu Hannover von Michaelis 1861 bis dahir 1862. 8vo. Pamph.

Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome VI. 1862. 8vo.

Journal of the Royal Dublin Society. No. 29. April, 1863. 8vo.

Proceedings of the Natural History Society of Dublin, 1859–62. Vol. III. Parts 1 and 2. 8vo.

Proceedings of the Royal Geographical Society of London. Vol. VII. No. 2.

Proceedings of the Royal Horticultural Society. Vol. III. No. 5. May, 1863. 8vo.

Canadian Naturalist and Geologist. Vol. VIII. Nos. 1–3. 8vo. Montreal.

Canadian Journal of Industry, Science, and Art. No. 46. July, 1863.

British American. No. 1. 8vo. Pamph. Toronto, 1863.

Silliman's American Journal of Science and Arts. No. 100, for 1862; 106–7, for July and Sept. 1863.

Proceedings of the Academy of Natural Sciences of Philadelphia. No 3. April and May, 1863.

New York State Library Catalogue. First Supplement. 8vo. Also, Catalogue of Maps, Medals, &c. 8vo. Albany.

Proceedings of Commissioners of Indian Affairs. 4to. Albany, 1861.

Results of Metereological Observations. By Franklin B. Hough, A. M. &c. 4to. Albany, 1855.

Tenth to fourteenth annual Reports of the Regents of the University of New York. on the condition of the State Cabinet of Natural History. 7 Pamphs. 8vo. 1837–63. *By exchange.*

Annals and Magazine of Natural History. Nos. 66–9, for June to Sept., 1863. London.

Journal de Conchyliologie. Tome 1, Nos. 3–4; Tome 2, Nos. 1–4. 8vo. Paris, 1861–2.

Malakozoologische Blätter. Band 8; Bogen 6–12. Band 9; Bog. 1–11. 8vo Pamphs. Hannover.

Proceedings of the Zoölogical Society of London. 1861, 1862. 2 vols. 8vo.

Monographie du Genre Conus par le Chevalier A. Bernardi. 8vo. Pamph. Paris.

Thesaurus Conchyliorum. By G. B. Sowerby. Part 21. 8vo. Pamph. London, 1862.

Quarterly Journal of the Geological Society. Vol. XIX. No. 75, for August. 1863. London. *From the Courtis Fund.*

Life and Letters of Washington Irving. Vol. III. 12mo. New York, 1863. *Deposited by the Republican Institution.*

October 7, 1863.

Mr. C. K. Dillaway in the chair.

The following paper was presented: —

On Certain Remarkable or Exceptional Larvæ, Coleopterous, Lepidopterous and Dipterous, with Descriptions of Several New Genera and Species, and of Several Species Injurious to Vegetation, which have been already published in Agricultural Journals. By Benj. D. Walsh, M. A.

COLEOPTERA.

Cicindela sex-guttata, Fabr. On eight or ten occasions, from the beginning to the end of May, 1861, I noticed bright and perfect specimens of the imago of this insect under the bark of oak logs in the woods. The species, as is well known, occurs exclusively in timber-land, and usually on foot-paths leading through the woods. Does its larva burrow in decayed wood and prey upon timber-borers? All known Cicindelidous larvæ burrow in the earth, but the imagos of certain foreign species, found in tropical America, are said by Westwood to haunt the leaves of trees, instead of the ground. (Westw. Intr. Classif. I. p. 49.)

COTALPA (AREODA) LANIGERA, Linn. On five separate occasions I have known the imago of this insect to be dug up in garden ground early in May, whence I infer that its larva feeds upon living roots, like that of the well-known May-beetle, (*Lachnosterna quercina*) and the European cockchafer (*Melolontha vulgaris.*) The closely-allied *Pelidnota punctata* Linn., on the contrary, lives in the larva state in rotten wood, whence I have myself bred it, and where it is recorded to breed by Dr. Harris. (Inj. Ins. p. 26.) Similarly the great majority of Elateridæ breed in rotten wood; but the larvæ of certain European species, and, as I believe from having bred the imago from garden-soil, that of the American *Cratonychus incertus* Lec., feed on the roots of living plants. An elateride larva (species unknown) has been observed by me to be very destructive to young corn plants in the West on newly-broken prairie, devouring the portion of the stem which lies under ground.

XYLORYCTES SATYRUS, Fabr. The larva of this species does not feed on decayed wood, as the generic name (Anglicè *timber-digger*) would lead us to suppose, and as do the allied genera Dynastes and Phileurus, but on the roots of living grass. It is very large, white, and remarkable for the head being coal-black and coarsely punctate, and in its general appearance it closely resembles the larva of Lachnosterna. In the spring of 1861 I bred the imago from a larva found late in the preceding autumn under a flat stone in a grassy place in the woods. In the latter part of September, 1861, having found another larva similarly situated, I carefully replaced the stone, and, on revisiting it some weeks afterwards, found, a few inches under the surface, the track by which the larva had travelled off, consuming the roots of the grass as it went. I am informed by my ornithological friend, Dr. Velie, of Rock Island, that he has found larvæ, which from his description must be those of this insect, two or three feet below the surface, in the spring of the year, on digging out the nests of bank-swallows in a grassy spot several hundred feet from the nearest timber. Hence we may conclude that it burrows deeply into the earth to pass the winter.

LEPIDOPTERA.

N. B. — In estimating the alar expanse of my Lepidoptera, it should be observed that I set my specimens with the wings well drawn forward, which of course slightly diminishes the expanse. The more accurate method is to give the length of the fore-wing; but as Lepidopterists generally have not yet adopted this rule, I have, for the sake of uniformity, followed the usual practice.

HALESIDOTA (LOPHOCAMPA) ANTIPHOLA, n. sp. The imago of this species is utterly undistinguishable from that of *H. tessellaris*, Sm. Abb. & Harr. though the larva is very different, and occurs on oak, basswood, etc., but never on hickory; while that of *H. tessellaris* is peculiar to the buttonwood or sycamore. I have now before me four specimens of *tessellaris* (3 ♂, 1 ♀) and two of *Antiphola* (1 ♂, 1 ♀), both species carefully bred by myself in separate cages in 1862–3, for the express purpose of testing their identity. The former came out June 22 and 28 and July 8 and 21, and the latter, July 6 and 10. I have also before me six specimens of *Antiphola* (3 ♂, 3 ♀) bred by myself from the oak in 1858–61, when I had never attempted to breed *tessellaris*. There is some considerable variation, especially in the shape of the wing-bands, in individuals of both species; but on the closest scrutiny I can detect no variation in one which does not also occur in the other species. For example, in the front wing, — 1st. The terminal wing-band is confluent in its middle, in a single point, with the subterminal wing-band, (1 *tessellaris* and one wing only of another specimen, and 2 *Antiphola*.) 2d. The subterminal wing-band is widely interrupted in its middle, with or without an isolated roundish spot of the same color as the wing-band in the interruption, (1 *tessellaris*, 4 *Antiphola*.) 3d. The short band, or semifascia, on the middle of the costa, which is normally composed of one roundish or squarish costal spot, and two long and narrow sub-costal spots, all three contiguous, has all these three spots separated by a distinct interval, (1 *tessellaris*, 1 *Antiphola*) or has only two of these spots separated by a distinct interval, (1 *tessellaris*, 2 *Antiphola*.) 4th. The fourth band, counting from the tip of the wing, instead of having its sides sub-parallel, is resolved into a costal roundish or squarish spot, which touches at a single point the remaining part of the band, (3 *tessellaris*, 1 *Antiphola*.) 5th. The fifth or basal band, which is normally composed of two roundish or squarish costal spots, separated from each other by a wide interval, and touching at a single point, or widely confluent with, a much larger postcostal or anal spot, has one or both of the costal spots separated distinctly from the large postcostal spot, (1 *tessellaris*, 4 *Antiphola*.) 6th. The shortest space between the fourth and fifth bands varies in *tessellaris* from .07 to .12 inch, and in *Antiphola* from .02 in a very small ♂ to .12 inch.

In the body there is scarcely any variation, except that the hind edge of the collar, which is bluish-green in *tessellaris*, either for its whole width or only in the middle, is immaculate in all my *Antiphola* but two, and even in those two less obviously bluish-green. In both species the inner edges of the shoulder-covers are bluish-green, and there is in addition a narrow bluish-green vitta between the shoulder-covers which has been overlooked by Dr. Harris. As regards the legs, there is a small black or fuscous spot on the inside tip of the anterior femora in three *tessellaris*, and three or four *Antiphola*. The head, palpi, and antennæ are exactly alike. In describing *tessellaris*, Dr. Harris omitted to say that each of the five wing-bands bordered by minute dusky spots is either pale ochrey-brown, or several shades darker than the ground-color of the four wings, which, as he correctly states, is a faint tinge of ochre-yellow. The omission has not been supplied in Dr. Morris's Synopsis. (See p. 348.)

The *larva* of *H. Antiphola* may be described as follows, from the living specimens: — Body covered with dense hairs, varying in color in different specimens from dirty-whitish to fuscous-cinereous, and from ochre-yellowish to pale yellowish-brown. On the first segment behind the head a lateral black pencil of hairs, beneath which are two white pencils, all directed obliquely forwards: on the second segment a lateral black pencil, beneath which is one white pencil, both directed obliquely forwards; on the eleventh segment, the same as on the second, except that the pencils are directed obliquely backwards, and that the white pencil is less obvious. When disturbed, this larva rolls itself up like an Arctian. Food-plants, oak, basswood, &c. Very common near Rock Island, Illinois.

The larva of *tessellaris* has its pencils located on the second and third segments instead of the first and second, and they are yellow or orange-colored instead of being some of them black and some of them white. The larva of *Carya* Harris, which I do not know, is said to have a pair of black pencils on the fourth and on the tenth segment, and the imago is quite different from *Antiphola*. The larva mentioned by Dr. Harris (*Inj. Ins.* p. 362) as occurring on various trees, but with the imago of which he was unacquainted, is described by him as having no pencils on the first segment, and cannot, therefore, unless the Harrisian description is faulty, be identical with *Antiphola*. The larva of *maculata* Harris has a pair of black pencils on the fourth and on the tenth segments, instead of the first, second and eleventh, and besides, the imago is said to resemble *carya*, not *tessellaris*. It is observable that Dr. Harris says that the caterpillar of *tessellaris* "is not correctly represented in Smith & Abbott's Insects of Georgia." Possibly the caterpillar of *Antiphola* may be there represented.

The difference between describing the individual and describing the species, and the consequent importance of describing, whenever practicable, from numerous specimens, is well exemplified in the case of these two insects. A writer who had only one or two specimens of each imago before him, might have been easily led to suppose that any one of the six or eight variations which I have enumerated as common to both species was a good and valid specific character, whereas, as I have shown, they are all individual aberrations. Length of body of *H. Antiphola* ♂ .57–.65 inch, ♀ .57–.72 inch. Expanse ♂ 1.65–1.97 inch, ♀ 1.73–2.00 inch. Four ♂, four ♀. Those who recollect Shakspeare's *Comedy of Errors* will understand the allusion conveyed by the trivial name.

SPHINGICAMPA, n. g.

Differs from Dryocampa, to which it is otherwise very closely allied, only as follows: — The larva is sphingiform and always assumes in repose the true sphingide attitude. In the imago the ♀ antennæ, as well as those of ♂, are bipectinate for their basal two-thirds, and minutely serrate for the remaining one-third. The ♀ pectinations, however, are only three-fifths as long as in ♂, and do not merge into the serrations so abruptly as in ♂. As in Dryocampa, the hind wings are much curved forwards on the basal half of their costal edge, so as to project far beyond the front wings in repose.*

SPHINGICAMPA DISTIGMA, n. sp. ♂ *Body* pale ochre-yellow, sides of the abdomen paler; venter tinged with brown. *Legs* fuscous-gray, tarsal claws and tips of tarsi beneath, fuscous. *Wings, above,* ochre-yellow, sometimes tinged with ochrey-brown. Front wings irregularly and thickly sprinkled with dusky dots; two-fifths of the distance from the base, along the costa, are placed two roundish white dots, equi-distant from each other, from the central point of the disk,

* Ceratocampadæ was first established as a distinct and exclusively American family by Dr Harris, but has been somewhat unnaturally united with Saturniadæ by succeeding authors, (Harris *Inj. Ins.*, p. 398; Morris *Synopsis*, pp. XXIV and 219.) Dr. Clemens has beautifully shown that it differs from Saturniadæ, not only in the characters laid down by Dr. Harris, but also in having "the subcosto-inferior nervule of the front wing *simple* and not *furcate*," (*Proc. Ent. Soc. Philad.*, I., p. 177.) In other words, in Ceratocampadæ the subcostal vein sends off towards its tip three branches or sectors which are all simple; in Saturniadæ the middle one of these three sectors, instead of rising directly from the subcostal vein, rises from the basal sector or branch, thus making that basal sector appear "furcate." (Compare Harris *Inj. Ins.*, figs. 187 and 194.) Sphingicampa, it may be added, follows strictly the Ceratocampade type in this respect, and it agrees with Dryocampa and differs from Ceratocampa in the palpi being very small and indistinct. The Harrisian family character, "♀ antennæ thread-like, and neither feathered nor toothed," must be modified so as to include Sphingicampa. It is remarkable that the typical forms in Ceratocampadæ all, so far as known, feed on the oak, and the aberrant forms upon other forest trees.

and from the costal edge, a line connecting them being at right angles to the costal edge, or sloping slightly towards the basal hind edge of the wing. These two dots are sometimes of equal size, sometimes the one nearest the costa has twice the diameter of the other, and occasionally *vice versa*; and in two or three specimens, there is a dusky cloud on their terminal side. At about one-seventh of the distance from the apex to the base commences a narrow and obscurely-defined fuscous band, slowly and gradually diverging from the terminal margin for three-fourths its length, when it suddenly converges with the terminal margin for the remaining one-fourth of its length, forming an angle of about 140° with its former course, and attains the interior margin. On the terminal side of this band, the ground-color of the wing is of a paler yellow, and generally with a faint, purplish tinge. Hind wings lake-red, except the sub-costa and the terminal one-third or one-fourth, or occasionally the terminal one-fifth. *Beneath*, the front wings have the same sub-terminal narrow band as above, but less distinctly angulated, and except towards its costal extremity, not fuscous, but dull lake-red. On the basal side of this band the sub-costa is bright ochre-yellow, with a few dusky dots, and the other part lake-red, shading off gradually to a pale, dull yellow with a tint of purple as the band is approached, which last color is continued beyond the band, where there are also a few scattering dusky dots. In a single ♂ the lake-red color extends nearly to the terminal edge. The hind wings are ochrey-whitish, sprinkled with dusky dots, especially along the costa: two-thirds of the way along their costa from the base there is a very obscure, narrow band, dusky towards the costa, elsewhere brown, gradually and slowly diverging from the terminal edge for three-fourths its length, and then angulated as in the front wing till it attains the interior or anal edge.

The ♀ differs only as follows: — In one specimen, the front wing above is almost ochrey-brown. In two, the white dots of the front wing are entirely absent; and in another, only the one next the costa is present, and is smaller than usual. The ground-color of the front wing is always the same on both sides the band. In one specimen, the lake-red color of the hind wing extends to its terminal margin. Beneath, the band on the hind wings is always very distinct, and wider than in ♂.

Length ♂ .91–1.00 inch, ♀ 1.00–1.15 inch. Expanse ♂ 2.12–2.44 inch, ♀ 2.50–2.93 inch. Six ♂, seven ♀, all bred from the larva. That there may be no possible doubt as to the ♀ antennæ being bipectinate, it may be as well to state that on June 22 a ♂ and ♀ copulated in the cage, and remained in copulation for half an hour after they had been pinned. The first imago, a ♀, appeared June 13, and the last, also a ♀, July 28, all without exception coming out about dusk.

The *larva*, which is described from the living specimens, is one of the most beautiful natural objects known to me. It is about 1.80 inch long and .45 inch in diameter, of a bright grass-green color, with scattered whitish tubercles, or short, robust thorns, very thickly set towards the anus, and a regular row of them at the anterior dorsal edge of the three or four first segments. Laterally, immediately beneath the line of spiracles, which are normal, from the third thoracic to the penultimate abdominal segment inclusive, there is a narrow, whitish vitta, bordered above by purple. On each side of the dorsum of thoracic segments 2 and 3 are two slender transversely arranged recurved horns, one-fourth inch long, tubercled, and either bluish or purplish at tip. On each side of joints 5, 7 and 9, or occasionally only on 7 and 9, and in three specimens on 5, 7, 9 and 10, are a pair of slightly recurved, highly-polished, silvery or nacreous thorns, the outer one short and robust, the inner one slenderish and .15 inch long. In one of the three specimens having a lateral pair of nacreous thorns both on 5, 7, 9 and 10, there are, in addition, single rudimental nacreous thorns on 6 and 8, in range with the longer nacreous thorns on 5, 7, 9 and 10; and in another one of the three there are such rudimental thorns both on 4, 6 and 8. In still another specimen, which has the normal pair of thorns on 5, 7 and 9, there is only a single lateral thorn on 10. On the dorsum of 11 is a horn similar to those on 2 and 3. Anus horizontal. Body, beneath, green, with smaller and denser tubercles. Legs rufous, tipped with brown-black; prolegs brown-black beneath as well as their hooks. Head rufous, rugose, with a longitudinal stria divaricating at an angle of 45° two-thirds of the way to the mouth, which is obfuscated. In two out of three alcoholic specimens, there is, on the middle of segments 2–11 or 4–10, just below the lateral white vitta, a short, robust black thorn, which I did not notice in the living insect, and several of the ventral tubercles are also brown-black. Described from twelve to twenty specimens. *Food-plant*, honey-locust. The first larva met with, which was full-grown and shortly after went under ground, occurred July 10. Most of my larvæ buried themselves three or four inches in the earth, but one of them only buried one-half of its body under the earth, the remaining part being covered by some dry leaves.

The *pupa*, which is not contained in any cocoon, is of the usual dark chestnut color, with deep, coarse punctures towards the anus, and has its anterior end armed with fifteen to twenty short, robust, hooked thorns, pointing in various directions. The piece covering the antennæ distinctly exhibits their bipectinations. The pronotum is obsemicircular, placed immediately behind the origin of the antennæ, and bears on its hinder suture, near the lateral apex of the semicircle a spiracle, in the form of a semi-circular opening .02 inch long.

The mesonotum is three times as long as the pronotum, and bears the front wing-cases, but no spiracle. Then follow two short pieces, each half as long as the pronotum, and neither of them bearing any spiracle, the anterior one bearing the hind wing-cases.* Then eight abdominal segments, all but the last of which bear a conspicuous lateral spiracle. At each end of abdominal joints 4 and 5, and at the anterior end of 6, is a close-set row of robust thorns, and a sub-obsolete row on the hind end of 3, 6 and 7; and the three grooves between 3–6 are very deep and wide. On the eighth or anal joint are about a dozen irregular thorns, and the anal thorn is .19 inch long, rugose beneath, tubercled above, and acutely bifid at its terminal one-fifth. Total length, 1.34 inch; greatest diameter, .39 inch. One specimen.

DRYOCAMPA BICOLOR (?) Harris. ♂ Three specimens, one of which I bred in 1861–2, and two on June 30 and July 30, 1863, from a normal Dryocampa-le larva feeding on oak-leaves in 1862, are utterly undistinguishable from *Sphingicampa distigma* ♂ Walsh, except by the front wings being slightly more tinged with brown. In one specimen the two white dots of the front wing are of equal size; in the other two the dot next the costa has twice the diameter of the other one. They scarcely differ from Harris's description of *bicolor* except as follows: — *First*, There are *two* obvious white dots on the front wing above, but, as we saw, a variety of ♀ *S. distigma* occurs with only *one* dot, as Harris describes *bicolor*. *Second*, The hind wings are lake-red above only on their basal two-thirds or three-fourths; but, as we have seen, a variety of ♀ *S. distigma* occurs with the hind wings entirely lake-red, as Harris describes *bicolor*. — Length ♂ .90–1.10 inch. Expanse ♂ 2.17–2.30 inch. Three ♂, ♀ unknown. As only the ♂ of *bicolor* was known to Dr. Harris, and as ♂ *bicolor* and ♂ *distigma* are undistinguishable, though the larvæ are entirely different, it is possible that *bicolor* Harris is identical with *distigma* Walsh, and distinct from *bicolor* Harris Walsh. Since, however, Dr. Harris's species has been currently referred to Dryocampa, I have thought it best to leave it in the genus where I found it.

What I suppose to have been the *larva* of *bicolor* resembled pretty closely that of *Dryocampa pellucida*, as described by Dr. Fitch (N. Y. Rep. II. § 324), so that imagining it to belong to that species, I failed to note the points of difference. As, however, I bred in the same cage specimens of *D. stigma*, and as Dr. Harris describes the larva both of *stigma* and *pellucida* very differently from Dr. Fitch, it may possibly have been the case that what I took for the larva of *stigma* was in reality the larva of *bicolor*. Both *S. distigma* Walsh and *D. bicolor* Harris Walsh differ from *D. senatoria*, *stigma* and *rubicunda*,

* I consider both these two pieces to be metanotal.

but scarcely from *pellucida*, in the angle formed by the costal with the terminal edge of the front wing being much less acute, or, in other words, by the interior margin being proportionally longer and the terminal margin proportionally shorter.

It is quite impossible that I should have bred both *distigma* and *bicolor* from the *same* larva, thus manufacturing *two* species out of *one*, because not only were the two species bred in distinct cages in 1862–3, but I bred, as already stated, a *bicolor* in 1861–2, which was a year before I became acquainted with the very remarkable larva of *distigma*.* I am familiar with the larva of *D. senatoria*, and never saw any of them assume the peculiar sphingide attitude, which the larva of *S. distigma* invariably assumes in repose, clasping at the same time the under surface of the main rib of the honey-locust leaf with its prolegs, so as to be overshadowed and concealed by the leaflets. The young larva of the allied *Ceratocampa regalis* is said by Dr. Harris "when at rest to bend the fore part of the body sideways, so that the head nearly touches the middle of the side." (Inj. Ins. p. 400.) *Sphingicampa* seems to be a beautiful connecting link between *Ceratocampa* and the sphingide genus *Ceratomia*, the larva of which last has, like the two former genera, horns on the meso- and meta-thorax. Indeed, until I noticed the antennæ of the pupa of *Sphingicampa*, I was fully persuaded that I had got hold of a new species of *Ceratomia*. The generic distinction between the imagos of *Sphingicampa* and *Dryocampa* is precisely similar to that between the imagos of *Attacus* and *Saturnia*.

It being thus shown that in Halesidota, Walker (= Lophocampa, Harris), two species which are quite distinct in the larva, are undistinguishable in the ♂ ♀ imago, and that in Dryocampadæ two species, belonging to distinct genera, and the larvæ of which are totally

* There is one possible source of error as to the distinctness of *Dryocampa bicolor* and *Sphingicampa distigma* which had escaped my attention. These two supposed species were, it is true, bred in separate cages and kept separate when buried for the winter, but in the spring the separate cages into which they were put were filled with fresh earth taken from my door-yard. In this door-yard stand two honey-locusts, from which I had obtained most of my larvæ of *distigma* in 1862. It is barely possible, therefore, that some of the fresh earth placed in the cage in the spring might have contained, unobserved by myself, a pupa of *distigma*; but on the supposition that my three specimens of *bicolor* were bred from such pupæ, it is necessary that this improbable thing should have happened, not only once in the spring of 1862, but twice in the spring of 1863. I am the less inclined to believe that this could have been the case, because Dr. Fitch has remarked that *D. stigma* (imago) "can sometimes scarcely be distinguished" from *D. senatoria* imago, and so far as regards the coloration I can confirm this fact from my own experience. Yet the larvæ of these two species are very different. (See Fitch, *N. Y. Rep.*, Vol. II., § 323.) Mr. Edwards writes me word that "he thinks in *D. pellucida* and *D. stigma* there is a great resemblance between either the ♂♂ or the ♀♀, he is not certain which."

unlike each other, are also undistinguishable in ♂ imago, the importance of carefully studying the larva state of every insect becomes at once apparent. Have these two pairs of species been apparently identical in the imago, either ♂ ♀ or ♂ only, and actually distinct in the larva, for all time since their supposed original creation? or were they identical both in larva and imago, perhaps some millions of years ago, and did an individual Halesidota then acquire a taste for buttonwood leaves instead of oak and bass-wood leaves, and an individual Dryocampa acquire a taste for honey-locust leaves instead of oak leaves, and propagate the same taste in its descendants through all time? Is it possible that in the course of millions of years a permanent change in food should have then produced external structural differences in the larva such as those we see between the larvæ of *H. tessellaris* and *Antiphola*, and between the larvæ of *S. distigma* and *D. bicolor*, and internal structural differences in the imago such as would prevent the sexual intermixture of the two races? I am acquainted with some cases where change of food produces a constant and very remarkable change in coloration in the larva, though none of any consequence in the imago. One of these cases, which is fortified by the authority of Abbott, (*Datana ministra*) I have recorded in the *Proc. Ent. Soc.* of Philadelphia (Vol. I. p. 296); and Dr. Fitch has recorded the very instructive fact that the mere shifting of their quarters, from the leaf to the ear of one and the same plant, produces in the descendants of *Aphis avenæ* (the grain plant-louse) a constant change of color from green to yellow or reddish-yellow. Again, that even structural differences may be propagated by hereditary descent in Mollusca to a whole local race, we learn on the authority of Dr. P. P. Carpenter. "It is a curious fact," says that author, "that whatever be the form of the operculum in the different tribes of predaceous mollusks, whenever it has been broken, and has to be repaired by the animal, it always takes a simple oval shape, with concentric layers, the nucleus being in the middle. In one place on the English coast there is found a race of *Buccinum undatum* (the common whelk of the English and American coasts), which perpetuates a very abnormal condition. They have two small opercula of more or less irregular shapes, but each of concentric elements. Probably their remote ancestor met with an accident, and has transmitted her mode of repairing the fracture to her descendants." (*Lectures on Mollusca*. Smithson. Rep. 1860, p. 176.) The phenomena of what are known as "self-tailed dogs" are familiar to many Englishmen. In the great grazing counties in the north of England a peculiar breed of dogs, known as the "Cur-dog," has been used for ages for driving cattle, as the Colley-dog is used for driving sheep, and so common has been the practice of cropping their tails that Bewick actually figures the animal with a short tail. "Many of these cur-dogs," says that writer, "are whelped with short tails, which seem as if they had been cut; and these are called self-tailed dogs." (*Hist. Quadrupeds*, 5th ed. p. 329.) More than thirty years ago, the gardener of one of my relatives at Thetford, in England, had, by continually cropping the tails of the kittens, originated, as I was credibly informed, a breed of *self-tailed* or short-tailed cats. It is singular that although Darwin mentions a race of stags "with an antler only on one side," which can only be supposed to have originated from accidental mutilation propagated by hereditary descent, yet that he should assert that "there is not sufficient evidence to induce us to believe that mutilations are ever inherited." (*Origin of Species*, pp. 123 and 130, Am. ed.) The very frequent and sometimes almost universal absence of the anterior tarsi in certain species of dung-feeding beetles can scarcely be explained, as he proposes, by the effects of disuse; for on that hypothesis we should surely find the anterior tarsi, when present in these species, abnormally short, as in the Lepidopterous Nymphalidæ; whereas, of more than twenty recent *Chœridium capistratum* examined by myself in 1860, only one had any anterior tarsi, but that one had them fully developed. I suspect that he is mistaken in saying (p. 123) that "in some genera [of dung-feeding beetles] the [anterior] tarsi are present, but in a rudimentary condition." Dr. LeConte, indeed, says that "in one genus, Dendropœmon, from Brazil, the tarsi have only two joints," (*Introd. Class. Coleopt.*, p. 125), but this is a very different thing from a true rudimentary tarsus, such as is found in the anterior legs of Nymphalidæ, where all the joints are present, but greatly reduced in length and functionally impotent (Argynnis ♀), or soldered together with no appearance of any sutures, (other Nymphalidæ.) Latreille says of the European genus Onitis, "antici pedes, in fœminis saltem, tarsis nullis." (*Gen. Crust. et Ins.*, II. p. 80.)

Nearly a hundred years ago, the borer that infests the locust (*Clytus pictus* Drury) was known by Forster "to inhabit the locust in the province of New York." (Quoted by Fitch, *N. Y. Rep.*, II., § 329.) Twenty-five and probably up to fifteen years ago, it was unknown in Illinois on the locust, although, according to our best Illinois botanists, the locust is indigenous in the southern part of the State. For many years back, it has been gradually working its way into the State westward and southward, destroying the locust-trees as it advances, and has now reached two points (Geneseo and Coal Valley) within twenty and twelve miles respectively of the Mississippi River at Rock Island. In northeastern and central Illinois, the locust-trees were pretty much destroyed several years ago, e. g. near Chicago, La-Salle, Bloomington, and Jacksonville. In Rock Island they are as yet untouched. Yet as much as six years ago I split a ♂ imago of

Clytus pictus, which I still preserve, out of a stick of hickory wood in Rock Island, and in the course of the next two or three years I took two specimens in the same neighborhood, which proves that the species has been all the time in existence there, feeding in all probability on our hickories and walnuts.* Is this hickory-feeding insect a distinct species, differing in the larva state, but apparently identical in the imago, or was there a brood of *Clytus pictus* one hundred years ago in the Eastern States, which acquired a taste for locust wood, and, by the laws of hereditary descent, handed over the taste to their descendants, which have gradually, in the course of a century, spread westward to the Mississippi River? We are bound, I think, to accept the latter hypothesis until the former one can be proved to be true. Will this locust-feeding race of *Clytus pictus*, in the course of an indefinitely long period of time ever acquire structural differences in the larva, similar to those which distinguish the larva of the oak and basswood-feeding *Halesidota Antiphola* from that of the buttonwood-feeding *H. tessellaris?* and is it probable that in the course of a still longer period of time the imagos may become distinct either in coloration, or in structure, or in both? To believe in the present existence of distinct species is one thing — nobody doubts that; to believe that they have always been distinct, and will always remain distinct, throughout all time from their supposed original creation, is another and a very different thing.

* After the above was placed in the hands of the Society (Sep. 2), a numerous swarm of the imagos of *Clytus pictus* has burst forth from the locusts in Rock Island. The locusts in our Court-House Square, which were planted twenty to twenty-two years ago, are now (Sep. 14, 1863) full of the borings of this insect, and two or three imagos may be found on the trunk of almost every one of them. Three years ago I carefully examined these same trees, and could not discover a single hole. Yet there are plenty of hickory trees growing within a mile of the Court House. I may add here that Prof. Sheldon, of Davenport, Iowa, has informed me that he has repeatedly, for many years back, split *Clytus pictus* out of hickory wood, and that, so far as he is aware, the locusts in Davenport are not yet attacked by this insect.

It is well known that the locust-feeding type of this insect occurs in the imago state exclusively *in the autumn*. The hickory-feeding type, on the contrary, is said by Mr. Bland to be abundant on that tree *in the spring*. (*Proc. Entom. Soc. Phila.*, I. p. 95.) Again, Dr. Harris describes the young larvæ of the locust-feeding type as "boring in the spring through the sapwood more or less deeply into the trunk, the general course of their winding and irregular passages being in an upward direction." (*Inj. Ins.*, p. 104.) Speaking of the hickory-feeding type, Dr. Horn describes the excavations of the larva as being "immediately subcortical not in a line, but in every direction," and says that it is not till "it is about to become pupa that it bores for a slight depth into the wood and for a distance of about three inches." (*Proc. Ent. Soc. Philad.*, I., p. 30, and compare p. 122.) Hence it would appear that the habits of the two types of this insect differ, especially as to the time of their assuming the imago state. The larva of the hickory-feeding type is fully described and figured by Baron Osten Sacken. (*Proc. Ent. Soc. Philad.*, I. pp. 105 and 121.) I am not aware that there is any full description extant of the larva of the locust-feeding type.

The following gradations in a regular series are, I think, established from the above-mentioned facts: — *First*, Races exist having distinct food-plants peculiar to each of them, but not, so far as known, differing either in the larva or imago, (*Clytus pictus*.) *Second*, Races exist having distinct food-plants, the larvæ of which differ most remarkably in coloration, but not in structure, and the imagos are almost and perhaps quite identical, (*Datana ministra*.) *Third*, There exist what, according to the accepted laws of classification, we must consider as distinct species, the larvæ of which are structurally distinct, and the ♂ imagos, to all appearance, identical, though there is every reason to believe that the ♀ imagos, one of which is unknown, are structurally distinct in the form of their antennæ, (*Sphingicampa distigma*, n. sp. and *Dryocampa bicolor* Harris Walsh.) *Fourth*, There exist what, according to the accepted laws of classification, we must consider as distinct species, the larvæ of which are structurally distinct, and the imagos, ♂ ♀, to all appearance, identical, (*Halesidota tessellaris* and *Antiphola*, n. sp.) *Fifth*, The great bulk of what we call distinct species are distinct either in coloration, or in structure, or in both, in both the ♂ ♀ imago and the larva states. — It is impossible, in my mind, to avoid arriving at the conclusion that these are but different stages in one and the same process, viz., the formation of a new species.

It is not necessary that those who believe in the origin of species by hereditary descent should believe in any one exclusive method by which those species are originated. Some, perhaps the great majority of species, may have been formed upon the Darwinian theory of Natural Selection, some by changes in the conditions of life, and especially by change of food, as in the above-recited cases, some by what Prof. Owen rather obscurely terms " the ordained potentiality of second causes, from single-celled organisms, with innate capacities of variation and development," (quoted in *Silliman's Journal*, Vol. XXXVI., p. 298), and some by other yet unexplained processes. No one cause appears to be sufficient to account for all the phenomena. Natural Selection does not explain the origin of many structures, both in the animal and vegetable kingdoms, which cannot be conceived to subserve any utilitarian purpose, and " innate capacities of variation " does not satisfactorily account for the many wonderful coädaptations of structure met with in almost every organized being.

LIMACODES SCAPHA Harris. Imago undescribed. ♀ Body robust, very pale chestnut-brown. Antennæ more than attaining the middle of the costa. Legs but moderately hairy, and of a very pale chestnut-brown color. Wings very pale chestnut-brown, above and beneath, the entire length of the costa of the front wing with a large, velvety, chestnut-brown patch, beautifully regular in its shape, and edged behind with silvery-white, which shades off gradually into the ground color. The shape of this patch may be thus defined: — With one leg of the compass on the middle of the costa, and with a radius equal to one-fourth of the costa, commence next the base of the wing, and proceed to describe a semi-circle; as soon as three-fourths of the semi-circular arc is described, draw from that point to the apex of the wing a circular arc of 45°, with its convexity towards the terminal margin, and connect the sub-costal vein, at the point of commencement, with the base of the wing by a line diverging from the costal edge, so as to double its distance by the time it attains the base of the wing. The whole spot thus constructed has somewhat the shape of the half of a very sharp-pointed acorn, the narrow stripe next the base representing the stalk, the three-fourths of the semi-circular arc the cup, and the arc of 45° the acorn itself. Length ♀ .43 inch. Expanse ♀ 1.19 inch. Length of cocoon .42 inch; breadth, .31 inch. One ♀; ♂ unknown. The larva fed on hickory leaves, but I have met with two specimens on the buttonwood or sycamore. The imago did not appear till the following summer. It is possible, but extremely improbable, that I may be mistaken in referring the above imago and cocoon to *scapha* Harris, as I had some other larvæ in the same jar with that of *scapha*.

Limacodes? hyalinus, n. sp. ♂ *Body* robust, covered with long, shining, brown-black hairs. Antennæ reaching one-third of the way along the costa, pale-brown, widely pectinate at base, the pectinations at base as long as the diameter of the eye, and gradually tapering to nothing at the tip; palpi concealed by yellowish hairs. Tip of *abdomen* with a brush of rufous hairs. *Legs* dull rufous, mostly covered by long, black hairs, hind femora covered with long, yellowish hairs, and the hind tarsi with rufous ones. Front *wings* narrow, three times as long as wide; hind wings triangular, the costal edge convex, the anal edge straight, the terminal edge very slightly concave, and the apex of the apical and anal angles acute and not rounded off. Disk of all four wings hyaline to the naked eye, but under the lens sparsely covered with fine, appressed, short, dusky hairs. Front wings with the veins, a narrow costal and terminal margin, a much wider interior margin, and a small spot at the tip of the discoidal cellule, all opaquely mottled with brown-black and ochre-yellow hair. Hind wings with the veins, a wide costal and interior margin, and a very narrow but definite terminal margin, all opaquely covered with brown-black hair. Length .36 inch. Expanse .70 inch. One ♂, which hybernated in the cocoon; ♀ unknown.

The *larva* is flattish, elongate-oval, of a palish brown color, with about nine pairs of laterally-projecting, flattened appendages, covered with short, dense, velvety hair, arranged along the entire length of its dorsum. Of these appendages, the third, fifth and seventh pairs project greatly beyond the others, the third and fifth nearly straight, but with the tips hooked backwards, the seventh regularly curved forwards. Each appendage has the hair parted down the middle of its upper, and so far as visible, of its lower surface, so as to point in contrary directions, and they are very slightly attached to the body, and are shaken off by the insect before proceeding to spin its cocoon. Beneath, above each spiracle, is a divergent bunch of pale-brown hair. Length (not quite full grown) .38 inch. Width, including appendages, .38 inch; without appendages .20 inch. Length of cocoon .35 inch; breadth .25 inch. *Food-plant*, wild cherry. One specimen. Comes very near to the larva of *L. pithecium* Sm. Abb. in the structure of its appendages, and seems to differ chiefly in the seventh appendage curving forwards and not backwards, and in the insect being much smaller. And yet the imago differs from Limacodes in the antennæ being pectinate, and in the remarkable shape of the hind wings, and will, probably, when the ♀ is known, form a new genus. Two larvæ, which occurred on the oak in the autumn of 1862, apparently belong to another species allied to *pithecium*, though I failed to breed them, one having died after spinning, and the other having produced from its cocoon, August 4th of the following year, a common species of Conops (Diptera) with the middle third of its abdomen sanguineous, perhaps *C. analis* Fabr. These latter larvæ were much larger than that of *hyalinus*, measuring, when recent, .70 inch; they agreed with it in having apparently nine pairs of appendages, the last pair very short, but they had only the third and sixth pairs projecting beyond the others, and both these pairs were curved backwards, with the extreme tips of each slightly hooked forwards. We may call this larva *Limacodes? tetradactylus.*

Hipparchiscus, n. gen.

(Belongs to the family Geometridæ.) *Palpi* long, projecting beyond the head about one diameter of the eye, the basal joints hairy, moderately long, and gently curved upwards, the terminal joint not hairy, short and porrect. *Antennæ* long, extending nearly two-thirds of the way to the apex of the expanded front wing, bipectinate three-fourths of the way to the tip in ♂ and subserrate on the other one-fourth, simple or scarcely subserrate in ♀. *Maxillæ* nearly as long as the antennæ. *Abdomen* ♂ with a terminal brush. *Legs* with the hind tibiæ ♂ furnished with a large fan-like brush of hairs; front tibiæ ♂ with a small brush of hairs; tibial spurs normal, but minute on the anterior legs; first tarsal joints fully as long as the four following put together. *Wings* simple; front wings subtrigonate, the interior margin perfectly straight, and the costal, interior and terminal margins about in the proportion of twenty-seven, nineteen and sixteen to each other, the apex of the apical and anal angles but slightly rounded off. Hind wings nearly as large and as wide as the front wings, and nearly in the form of half a quadrant, the costal and interior margins straight, and equal to each other, the terminal margin strongly curved in its middle, so as to foreshadow a tail, and more gently elsewhere ; the apex of the apical angle much rounded off, that of the anal angle scarcely rounded off. Fringes unicolored. *Larva* ten-footed, its dorsum with curved lateral appendages covered with short, velvety hair, and similar to those of *Limacodes? hyalinus* Walsh, except that they are much shorter and none of them abruptly longer than the others.

Hipparchiscus venustus, n. sp. ♂ ♀ Milk-white. *Head* with a large, squarish, ferruginous spot extending from eye to eye before the base of the antennæ ; occiput grass-green : antennæ of ♂, with a pair of the longest bipectinations, which lie about one-fourth of the way from the base, expanding two-thirds the diameter of the eye. *Thorax* grass-green above. *Abdomen*. with the dorsum of segments 1–3 grass-green, segment 1 with a milk-white, squarish dorsal spot covering its whole length, and 3 with a similar spot, generally confluent with the white surface of 4, but occasionally, when 4 and 5 are also marked with green above, as distinct as the other spot. *Wings* grass-green, white on the basal three-fourths of their costal edge, their fringe white, and each wing with two narrow, linear whitish fasciæ, the *locus* of which may be thus defined : — Let the interior margin of the front wing and the costal margin of the hind wing touch as near as may be ; then trisect the interior margin of the front wing, and, with one leg of the compasses on the extreme base of either wing and the other leg on the point of trisection nearest to the base, describe a circular arc on either wing. From the other point of trisection draw upon either wing a line parallel with the terminal margin : and let each one of these four lines be slightly sinuate, and let that next the base of the front wing be almost serrate. Length ♂ .40 inch, ♀ .35–.39 inch. Expanse, ♂ 1.06 inch, ♀ 1.00–1.18 inch. One ♂, two ♀, one of which was bred May 11th from the *larva*, which hybernated, without spinning any cocoon, at the bottom of a glass jar. *Food-plant*, oak. The grass-green color in this insect is nearly the same shade found in *Attacus luna*, but scarcely so yellow. The *larva* was a true "looper," of the usual cylindrical shape, and of a dingy-brown color, and including the appendages measured about one-fourth of an inch across. The *pupa* is of a pale ochrey-brown color, varied with reddish-brown, with many fuscous dots, especially along the nervures of the wing-cases, and with the caudal thorn simple. It measures .43 inch, including the thorn ; (from the pupal integument.)

This species cannot be referred with propriety to any one of the eighty-five British genera of Geometridæ. *Hipparchus* Leach, *Hemithea* Duponchel, and *Chlorissa* Stephens, all agree with it in the wings being green, but it differs from the first in the hind wings not being denticulate, from the second in the palpi not being short, and from the third in the ♂ antennæ being distinctly bipectinate. I am not aware, either, that any described genus of Geometridæ has the larva furnished with the remarkable lateral appendages met with in this insect, or the *hind* tibiæ of the ♂ imago furnished, as in this insect, with large fan-like brushes. Such brushes, indeed, occur in the *front* tibiæ of many Pyralide genera, e. g. Macrochila, Pechipogon, and Paracolax, commonly called "fan-footed moths," and I notice them in five or six U. States Pyralide species in my collection. In another green Geometride species in my collection, which manifestly belongs to a distinct genus, there is no such fan-like brush on the ♂ hind tibiæ, though, as in several other genera in this family, there is a small one on the ♂ front tibiæ.

DIPTERA.

The only known Tabanide larva, as I am informed by Baron Osten Sacken, has been described by De Geer, and was terrestrial. (See *Westw. Intr.*, II., p. 541 and fig. 128, 9.) The following is aquatic, and the imago obtained from it belongs to the genus Tabanus, but is in too bad condition to be specifically determined, having remained many weeks unattended to in the breeding-jar. I have, on many different occasions, found this larva amongst floating rejectamenta. On one occasion I found six or seven specimens in the interior of a floating log, so soft and rotten that it could be cut like cheese. Once I discovered a single specimen under a flat, submerged stone, in a little, running brook. And finally, I once met with one alive, under a log, on a piece of dry land which had been submerged two or three weeks before, whence it appears that it can exist a long time out of the water. I had, on several previous occasions, failed to breed this larva to maturity, and the only imago I have was obtained in 1861, from larvæ, which, suspecting them to be carnivorous from the very varied stations in which they had occurred, I had supplied with a number of freshwater mollusks, but the habits of which, in consequence of having been away from home, I was unable to watch. On Sept. 2d, 1863, I found a nearly full-grown larva amongst floating rejectamenta, and between that date and Sept 23d, he has devoured the mollusks of eleven univalves (*Gen. Planorbis*) from one-half to three-fourths of an inch in diameter; and on three separate occasions I have seen him work his way into the mouth of the shell. In this operation his pseudopods were energetically employed, and I found, on cracking the shells after he had withdrawn, that a small portion of the tail end of the animal was left untouched — no doubt in consequence of his being unable to penetrate to the small end of the whorl of the shell — and also the skin of the remaining part and the horny tongue-membrane.

Several species of Tabanus are so prodigiously abundant in Illinois, in districts remote from any large streams or ponds, that they must evidently breed in the earth, like DeGeer's species, not in the water, like mine. There are prairies in Central Illinois, as I am credibly informed by numerous witnesses, across which it is impossible to ride or drive a horse in the heat of a summer's day on account of the Tabanus. The most troublesome species is rather larger than *T. lineola* Fabr., and when alive, its eyes are of a brilliant emerald-green, whence it is popularly known as the "greenhead." This species is pretty common every year in the adjoining county of Henry, yet I have never met with it in Rock Island County, Ill., which lies immediately north-west of Henry, though we have eight other species of Tabanus, all rare but *lineola*; and I believe it does not generally occur in Northern Illinois. Baron Osten Sacken has commented to me on the singular fact, that, although Tabanidæ are so numerous in individuals, we scarcely ever meet with their larvæ. But this will not appear so remarkable when we reflect, that of the only two species known in the larva state, one hides itself in the earth and the other in the water.

If, therefore, as appears from the above considerations, the larvæ of many, perhaps most, of our Tabanidæ live in the ground, and if, as there is every reason to suppose, the larvæ of the terrestrial species are as carnivorous as I have shown those of the aquatic species to be, there can be little doubt, considering how numerous in individuals many of the species are, that they must destroy, during their larva life, innumerable noxious subterranean larvæ, *Melolonthadæ*, *Lyttadæ*, *Tipuladæ*, etc. They certainly cannot, at least in Illinois, feed habitually upon land-snails, for land-snails are quite scarce in that State. The scheme of the Creation is perfect, and Nature is never at fault. It is only when Nature's system is but half understood that we heedlessly complain of its imperfections. We blame the house-flies for annoying us, and fail to see that in the larva state they have cleared away impurities around our dwellings, which might otherwise have bred cholera and typhus fever. We execrate the blood-thirsty mosquito, and forget that in the larva state she has purified the water, which would otherwise, by its malarial effluvia, have generated agues and fevers. In all probability, when we rail at the Tabani, that torment our horses in the summer, we are railing at insects which, in the larva state, have added millions of dollars to the national wealth, by preying upon those most insidious and unmanageable of all the insect-foes of the farmer — subterraneous root-feeding larvæ.

TABANUS ——? Imago ♂. Blackish. Legs blackish; wings brownish-fuscous. Length .70 inch. Expanse 1.30 inch. One decayed specimen came out between June 14 and July 14, 1861, from a larva found early in June.

Larva (from two living specimens, obtained August 14th, 1860, and September 2d, 1863). Length 2.25 inch when extended, 1.75 inch when contracted; diameter .25–.30 inch. The specimen found in 1863, .25 inch shorter. Body cylindrical, twelve-jointed, the three or four terminal joints much tapered at each end of the body, but more so anteriorly than posteriorly, and joints one and eleven, each with a retractile membranous prolongation at tip. Joints one to ten are subequal; eleven is about two-thirds as long as ten, and twelve about one-fourth as long, and .05 inch in diameter. Color a transparent greenish-white, paler beneath; an irregular dark-green or greenish-black annulus, paler beneath, on the anterior and posterior margins of joints two to eleven, the anterior annulus laterally connected with the posterior by two to four dark-green lines. On the dorsum of four to nine, and more obscurely on ten, a dark-green basal triangle, extending half-way to the tip; joint one with paler markings, and with no dark annulus behind; joint twelve entirely fuscous. Head small, apparently fleshy, pale, truncate-conical, .03 inch wide, and about .04 inch long in repose, inserted in joint one without any shoulder The trophi occupy two-thirds of its length, but it has a long cylindrical internal prolongation, extending to the middle of joint two, which is sometimes partially exserted, so that the head becomes twice as long as before. All the trophi are pale and apparently fleshy, except the mandibles, which are dark-colored and evidently horny, and they have no perceptible motion in the living insect. The labrum is slender, a little tapered, and three times as long as wide, on each side of and beneath which is a slender, thorn-like, decurved, brown-black mandible. The labium resembles the labrum, but is shorter, and on each side of it is a slender palpiform, but exarticulate maxilla, extending beyond the rest of the mouth in an oblique direction. No palpi. On the vertex are a pair of short, fleshy, exarticulate, filiform antennæ, and there are no distinct eyes or ocelli. In the cast larval integument the entire head, .25 inch long, is exserted, and is dark-colored and evidently horny, all the parts retaining their shape except the antennæ, labrum and labium. The whole head has here the appearance of the basal part of the leaf of a grass-plant, clasping the origin of the maxillæ on its posterior half, and bifurcating into the somewhat tapered cylindrical mandibles on its anterior half. The maxillæ are traceable to two-thirds of the distance from the tip to the base of the head, scarcely tapering, bent obliquely downwards at two-thirds of the way to their tip, and obliquely truncate at tip. On the anterior margin of ventral segments four to ten, in the living insect, is a row of six large, fleshy, roundish, tubercular. retractile pseudopods, the outside ones projecting laterally, and each at tip transversely striate and armed with short, bristly pubescence; on the anterior half of ventral joint eleven is a very large, transversely-oval, fleshy, whitish, retractile proleg, with a deeply-impressed, longitudinal stria. On the anterior margin of dorsal joints four to ten, is a pair of smaller, transversely-elongate, retractile, fleshy tubercles, covering nearly their entire width, armed like the pseudopods, but not so much elevated as they are. No appearance of any spiracles. Anus terminal, vertically slit, with a slender, retractile thorn .05 inch long, visible in 1860, but not in 1863. Head, and first segment or two, retractile.

When handled, this larva is very vigorous and restless, and burrows with great strength between the fingers, and even on a smooth table walks as fast as any ordinary caterpillar, either backwards or forwards; when placed on its back it progresses with difficulty by the aid of the dorsal tubercles. The external integument is very transparent, and as the insect progresses, slides backwards and forwards over its internal organs, like the finger of a glove. When placed in a vessel of simple water it swims vigorously, twice the length of its own body at every stroke, by curving its tail round laterally, sometimes to the right, sometimes to the left, so as to touch the side of the fourth or fifth joint, and then suddenly lashing out with it. In such a vessel it keeps all the time close to the surface, and at the end of every stroke, and also when in repose, elevates the anal slit out of the water, on which occasion I once saw a bubble of air attached to it. In the breeding-jar it scarcely ever comes to the surface, but burrows among the decayed wood, aquatic plants, &c.

This larva differs remarkably from the one described by DeGeer, in having ventral pseudopods as well as dorsal ones. It might be supposed that the dorsal tubercles were branchiæ, but for the fact that they are found in the earth-inhabiting species described by DeGeer, and that their structure resembles that of the pseudopods. I conjecture that, like the aquatic larva of *Prionocyphon discoideus* Say (Coleoptera), of whose habits I have given an account in Baron Osten Sacken's Paper on Coleopterous larvæ (*Trans. Ent. Soc. Philad.*, I., p.117), it has a branchial apparatus issuing from its anus, and that the short, retractile anal thorn, which I saw in 1860, was the form assumed by this apparatus when out of the water. But for a lucky accident, I should have been ignorant of the true form of the expanded anal branchiæ, in *Prionocyphon*. Occurs from the beginning of June to the beginning of September, at which last time I have also met with a specimen only half the length of the full-grown specimen.

The *pupa* (from the pupal integument) is cylindrical, suddenly rounded at the head, and tapering a little in the two last abdominal joints: the color is a very pale, semi-transparent, yellowish brown. The mouth is represented by six tubercles, hexagonally arranged, above which, upon each side, is a trigonate, three or four-jointed antenna, pointing outwards. The pronotum commences immediately behind the antennæ, and bears on its anterior dorsal submargin a pair of reniform, tubercular spiracles. The mesonotum, to which the wing-cases are attached, is twice as long as the pronotum, and bears on its anterior dorsal margin a pair of obliquely-placed, reniform, tubercular spiracles, three times as long as the prothoracic ones. Then follows a very short metanotal piece, about one-seventh as long as the pronotum, bearing no spiracle, which is succeeded by eight subequal segments, all but the last bearing on their lateral dorsal surface a subbasal, round, tubercular spiracle. The first of these eight segments is simple, and extends to the tip of the wing-cases;* the others are all furnished two-thirds of the way to their tips with an annulus of appressed bristles directed backwards. The anal thorn is very robust, having a diameter of one-half the last abdominal segment, and is squarely truncate as soon as its length is half its width, and terminates in six small, robust thorns, arranged in a regular hexagon. Length .97 inch; greatest diameter .21 inch. One specimen.

Midas fulvipes, n. sp. ? ♂ Black. Epistoma (rhomboidal piece beneath the origin of the antennæ), dark rufous with dense fulvous hairs; antennæ dark rufous. Thorax opaque, a little rugose, with scattering erect hairs. Abdomen and venter polished, glabrous, with fine short appressed hairs. Legs with the knees, tibiæ and tarsi fulvous. Wings black on the costa, shading into palish fuscous on the terminal and interior margin; no metallic or colored reflections. Length ♂ .89 inch. Expanse ♂ 1.70 inch. One ♂; ♀ unknown. Easily distinguishable from *clavatus* Drury, of which I took numerous specimens in South Illinois, but which does not occur near Rock Island in North Illinois, by the particolored legs and the immaculate abdomen. Baron Osten Sacken informed me that this insect "seems to be new, and is certainly new to him."

The *larva* of what I suppose to be the ♀ of the above is, when nearly full grown, from 1.50–1.75 inch long, and .31 inch in its greatest diameter. The head is of a polished mahogany-brown color, pointed and thorn-like, being about .10 or .11 inch long, and .03 or .04 inch in

* I believe this first spiracle-bearing segment to be metanotal, as also the corresponding piece in the pupa of *Midas fulvipes*, *u. v.*

diameter at its base. It has a few hairs on its surface, and is almost entirely retractile. The body is cylindrical, somewhat depressed, or rather laterally expanded, whey-colored, with the appearance, even to the naked eye, of irregular patches of small, round, white eggs over nearly one-half its surface, except on the first, second, and partially on the third, segment. The external integument, between most of the middle segments, is retractile, and furnished below with tubercles (pseudopods), which entirely disappear at the will of the animal. Segments three to one are tapered gradually, so as to leave no shoulder at the head, and segment twelve is tapered suddenly to an obtuse point when viewed from above, but when viewed in profile there is a large, triangular prominence on its entire inferior edge. On each side of segment eleven above there is a large brown spiracle — on the other segments none. The larva of the ♂ was much smaller, and varied only in entirely wanting the appearance of masses of eggs on its surface. Described from the living specimens. One ♂ : one (supposed) ♀.

The pupa of the supposed ♀ (described from the pupal integument) is cylindrical, a little stouter on the thorax, suddenly rounded off before, and gradually and slightly tapered on the last two or three segments. The general color is a dark chestnut-brown. On each side of the head and above the mouth, which is inferior, is a very large, obliquely-elongate tubercle, sloping towards the occiput, and representing, perhaps, the antennæ. On the extreme occipital end of this tubercle, and also near the other end, is a long, slenderish, acute thorn tipped with black. The pronotum, which bears a dorsal pair of flattish, round, and not very obvious spiracles a little behind the anterior margin, is armed on the middle of its lateral dorsum with a still longer slenderish, acute thorn, about .08 inch long, directed outwards and upwards, curved slightly backwards, and tipped with black. The mesonotum is two and one-half times as long as the pronotum, has a small, robust thorn on the middle of the origin of the wing-case, and on its humerus, close to the suture, bears a spiracle in the form of a round tubercle, terminating in a nipple-like, obliquely-arranged double tubercle. Behind the mesonotum is a short metanotal piece, scarcely half as wide as the pronotum, which is succeeded by eight subequal segments, all but the last bearing a lateral dorsal spiracle, similar to that of the mesonotum, except that the crowning double tubercle is transversely arranged. The first of these segments* is armed on the anterior edge of the whole

* I believe this first spiracle-bearing segment to be metanotal, and to be homologous with the non-spiracle-bearing piece, which follows the piece bearing the hind wings and precedes the spiracle-bearing abdominal joints, in the pupa of Sphingicampa and all other Lepidopterous pupæ known to me In the Lepidopterous pupa, as in the larva, neither meso - nor meta-thorax bears any spiracle; in these tw dipterous pupæ both of them, as I believe, bear spiracles

of its dorsal surface with a close-set row of long, slender, flattish thorns, like teeth cut out of a saw-plate, curving upwards, but directed obliquely forwards, and about .05 inch long: on its sternal surface the hind edge, except where it is covered by the wing-cases, which extend slightly beyond it, is armed with a close-set row of similar straight thorns, directed obliquely backwards; and the entire hind edge of two to eight is armed in a similar manner, except that the thorns are somewhat shorter, the suture between one and two being simple on the dorsum. The anal thorn is composed of two thorns, each .15 inch long, laterally divaricate at an angle of about 60°, but confluent at base, their basal half robust and wrinkled, their terminal half slenderish, glabrous, black, and terminating in a very slender claw curved obliquely downwards; and the basal part of this double anal thorn is almost as long and as wide as the eighth segment, but somewhat tapered at tip. The pupa of the ♂ differs only in being a little shorter, very much slenderer, and of a pale yellowish-brown color. (From the pupal integument.) Total length ♂ 1.18 inch; ♀ 1.30 inch. Total abd. diameter ♂ .23 inch; ♀ .37 inch. One ♂; one (supposed) ♀.

On March 28th, 1860, I found the above-described two larvæ near Rock Island, Illinois, in some fibrous *débris* contained in a hollow sycamore. I placed them in a vessel containing about a gallon of the *débris*, intermixed with which I noticed several common larvæ, elateridous, &c.; and in the following July, what I have little doubt, from the comparative largeness and robustness of the pupal integument, was the ♀ imago, came out, but by some means or other made its escape. No other species of Midas exists near Rock Island, so far as I am aware, to which it might be referred. The smaller larva, which proved to be ♂, lived from the summer of 1860 till the following spring, healthy, but without perceptibly growing, when I supplied him with twelve to twenty large, vigorous, lepidopterous pupæ, all of which were either killed by him or else died a natural death, and between the middle of June and the middle of July, 1861, the ♂ imago made its appearance. From these facts I conclude that the larva of Midas is insectivorous, and I suspect that all dipterous larvæ with pointed beaks are so, e. g. that of Xylophagus, which occurs sparingly near Rock Island, Illinois, under decaying bark. The beaked larva of Tabanus I have already referred to. If I am right in supposing the large larva to have been ♀, and if, as I believe, those were the eggs of the insect itself that exhibited themselves on its surface, but of which no traces were visible in the ♂ larva, we have here the only example known to me of sexual characters being discoverable, without dissection, in the larva state of an insect belonging to an Order where the Pupa is quiescent and the metamorphosis complete.

References to such Articles, furnished by the Writer to various Agricultural Journals, as contain new Facts in Economic Entomology.

COLEOPTERA.

Ips quadrisignata Say, attacks the growing ears of sweet corn. (Illinois *Prairie Farmer*, about Sept. 1, 1860.)

Chrysobothris femorata Fabr., and saperda vittata Say, the two apple-tree borers. (*Journal of the Illinois State Agric. Soc.*, June, 1862, pp. 21–3.)

Amphicerus (bostrichus) bicaudatus Say, bores apple-tree twigs. (*Prairie Farmer*, about May 10, 1860, pp. 308–9, with figures.)

Brachytarsus variegatus Say, parasitic (?) on a large orange-colored cecidomyiade (?) larva in the stems of wheat. (*Jour. Ill. State Agr. Soc.*, March, 1862, pp. 8–12, with figures.)

Ithycerus noveboracensis Forster, attacks the twigs of fruit-trees in the nursery. (*St. Louis Valley Farmer*, March, 1862, pp. 82–5, with figures.)

Anthonomus prunicida Walsh, has the same habits as *Conotrachelus Nenuphar* Hbst. (the "curculio"), and equally common in the valley of the Mississippi. (*Prairie Farmer*, June 13, 1863, and July 11, 1863, p. 21, with figures.)

"Anthonomus (?) prunicida n. sp. Black, with dense and long whitish pubescence. Head dark rufous, with whitish pubescence; rostrum dark rufous impubescent, confluently punctate, and with a longitudinal carina above and a longitudinal stria beneath, the sculptures in one sex (♀?) ceasing at the insertion of the antennæ. Prothorax dark rufous, above with dense and long golden pubescence, beneath with short whitish pubescence; a wide, flattish, black, naked, dorsal carina, lanceolate at tip and striate longitudinally, extending two-thirds of the distance to its tip. Elytra black, with fine, dense, short, whitish pubescence, punctate-striate with large oblong punctures, the interstices finely punctured and with irregular alternate tufts of white and black hairs, chiefly along the suture and submargin and at the tip; scutel generally with dense white or yellowish hair, and generally on each side of it two conspicuous tufts of black hair, the inner one the larger of the two. Legs dark rufous with whitish pubescence. Wings blackish. Length to tip of rostrum, .30–.35 inch. Pronounced by Dr. J. L. LeConte, in 1861, to be 'unknown to him.'

"This species differs from *Anthonomus* in the third joint of the antennæ being three-fifths as long as joint two, whereas in *A. quadrigibbus*

Say and *A. scutellatus* Schonh. it is only one-third as long as joint two. It differs, also, in the four posterior tibiæ not being dilated in the middle. Joint two of the antennæ is long, three, as before stated, is three-fifths as long as two, four is half as long as three, and five to eight are quite short. The antennæ are inserted three-fifths of the distance from the eyes to the tip of the rostrum. The rostrum is half as long as the body, porrect and not received in a groove between the legs. The femora are all incrassated with a large postmedial tooth. The anterior tibiæ are slightly dilated in the middle, and have a small terminal hook; the other tibiæ are simple. The body is elongate-oval, the thorax a little narrower at its base than the elytra.

"I annex the above generic particulars, because even Dr. LeConte did not venture to determine the genus of this insect. It may, perhaps, form a new genus; but it comes nearer to *Anthonomus* than any other with which I am acquainted. From *Erirhinus*, *Centrinus*, and *Baridius*, it is separated at once by the femora being toothed, from *Balaninus* by joints two to eight of the antennæ not diminishing in length gradually and but very slightly, and from *Magdalinus* by the antennæ being distinctly elbowed." (From the *Prairie Farmer*, June 13, 1863.)

"CONOTRACHELUS PUNCTICOLLIS, n. sp. Head black, with a coppery lustre, finely pubescent, with very fine confluent punctures: rostrum suddenly bent inwards at two-thirds the distance to its tip, as in *C. anaglypticus* Say. Thorax black, sparsely pubescent, much narrower than elytra, as wide as long, scarcely contracted at its base, but much contracted at its tip, with very large, deep punctures, confluent above, so as to form towards its tip three or four irregular, longitudinal carinæ. Elytra regularly punctate-striate, without any carinæ, the striæ shallow and wide, the punctures moderate; the insterstices flattish, very finely punctured, and with a row of short, cinereous bristles upon each directed obliquely backwards; the whole elytrum irregularly mottled with whitish and brown, so as to appear gray with three or four indistinct, brown fasciæ, except on the base of the third interstice, where there is a conspicuous, short, whitish vitta. Legs blackish, with fine, short, whitish pubescence. The second tooth of the femora obsolete.

"Length .15 inch. One specimen. Near *C. cribricollis* Say, but that species has the elytra black, without any bristles. Except in the comparative shortness of the thorax, it resembles in its shape *C. anaglypticus* Say, and is much broader than *C. nenuphar* — the 'curculio.' Beaten off tame plum-trees, at Springfield, Illinois." (From the *Prairie Farmer*, July 11, 1863, p. 21.)

CONOTRACHELUS POSTICATUS (?) Schönh., bred in the spring of

1863, from haws infested by its larva in the autumn of 1862. (*Prairie Farmer*, July 18, 1863, p. 37.)

"CONOTRACHELUS CRATÆGI, n. sp., has the size, shape and sculpture of *anaglypticus* Say, but differs in the elytra being of a uniform color, mottled with ochre-yellow and white, and in the upper surface of the thorax being whitish, except a large and conspicuous triangular spot at its base and the anterior margin, which, as well as the inferior surface, are brown. The second tooth on the femora is obsolete. Abundant near Rock Island, Ill., on the hawthorn. I found it very plentiful, also, near Chicago, on the same tree." (*Ibid.*)

EPICÆRUS IMBRICATUS Say, infests apple and cherry trees and gooseberry bushes, in Iowa. (*Prairie Farmer*, July 18, 1863, p. 37, with a figure.)

"There are four described N. A. species of *Epicærus*, — *imbricatus*, *vadosus*, *formidolosus*, and *fallax*. Dr. LeConte informs me that he believes all four to be mere varieties of one and the same species, in which I entirely agree with him, so far as my knowledge of the genus extends.

"Of the six specimens received from Iowa, two agree pretty closely with Say's description; two are of a nearly-uniform whitish color, with scarcely any appearance of darker bands on the elytra, and two have indistinct dark bands. My three Rock Island specimens have the dark bands very distinct, — much more so than in the Iowa specimens, — and were referred to *fallax* by Le Conte, with the remark above quoted.

"From the nine specimens, it would be easy to construct a regular series, from the almost immaculate variety to the distinctly trifasciate. The slightly-impressed, punctured, dorsal line on the thorax, mentioned by Say, is obsolete in one of the pale Iowa specimens, and in all my Illinois dark ones." (*Ibid.*)

SITOPHILUS REMOTEPUNCTATUS Gyllenh., in Patent Office wheat. (*Journ. Ill. State Agr. Soc.*, Jan., 1862, with a figure.)

DORYPHORA DECEM-LINEATA Say, infests potato and tomato vines, egg-plants, &c., in Kansas and Iowa. (*Valley Farmer*, July, 1862, pp. 209–10, and *Prairie Farmer*, June 6, 1863, p. 356, with figures.)

LYTTA ATRATA, infests flowers of cultivated Asters, and *L. atrata*, *vittata* Fabr., (= *lemniscata* Fabr.,) and *cinerea* attack potato vines. (*Prairie Farmer*, Aug. 29, 1863, with a figure.)

CHILOCORUS BIVULNERUS Muls., attacks unknown enemies of the apple-tree. (*Prairie Farmer*, Aug. 22, 1863, with figures.)

ORTHOPTERA.

Grasshoppers and locusts; LOCUSTADÆ and CICADADÆ. (*Journn. Ill. State Agr. Soc.*, Nov. 1862, pp. 1–3.)

Catydid eggs, on apple-tree twigs. (*Prairie Farmer*, Feb. 28, 1863, p. 132, with a figure.)

LEPIDOPTERA.

LEUCANIA UNIPUNCTA Haw. (army-worm moth), its four primary parasites *Exorista militaris* Walsh, (Diptera) *Mesochorus vitreus* Walsh, *Pezomachus minimus* Walsh, and *Microgaster militaris* Walsh, and its two secondary parasites, *Chalcis albifrons* Walsh, and *Glyphe viridescens* Walsh, (Hymenoptera.) (*Trans. Ill. State Agr. Soc.*, IV., pp. 349–72. *Prairie Farmer*, about Sept. 24, 1861; both articles reprinted *Trans. Ill. Nat. History Soc.*, Vol. I.; *Prairie Farmer*, Dec. 6, 1861, pp. 370–1.)

SOLENOBIA (?) ——— (larva,) under bark of apple-trees. (*Prairie Farmer*, Aug. 29, 1863.)

PHYCITA NEBULO Walsh, or the Rascal Leaf-crumpler, infests apple, crab, and plum trees. (*Prairie Farmer*, about May 10, 1860, p. 308, with figures.)

"PHYCITA NEBULO, n. sp. Expansion of wings .70 inch. Length of body .30 inch. General color, light cinereous, varied with dusky. A row of about seven subsemilunar or linear dark spots on outer margin of front wing. Then, one-fourth of the distance to the body, a waving light, cinereous band, parallel to the exterior margin, marked on each side with dusky black. Nearly at the centre, a much abbreviated black band. Beyond the centre, on the costal margin, a subtriangular dusky black spot, the apex of which connects with the apex of a much larger subobsolete triangular brick-red spot, which extends to the interior margin, and is bounded on the outside by a wavy, light cinereous band, which is bounded outside by a wavy dusky black band, proceeding from the apex of the costal triangle. Base of wing dusky black, enclosing a small, round, light cinereous spot. Hind wings and all beneath, light cinereous shaded with dusky, the front wings darker. Tarsi dusky, with a narrow, light cinereous fascia at the apex of each joint. Hind tibia fasciate with dusky at the apex, sometimes obscurely bifasciate. Intermediate tibia fasciate with dusky at the centre, the fascia generally extending to the base, but becoming lighter. Anterior tibia dusky, with a narrow, apical, light cinereous fascia. Palpi, both labial and maxillary, dusky." (*Ibid.*)

The *larva* lives in a little crooked horn or case, and ties together with silken threads the terminal leaves of young twigs. Frequently, in travelling from twig to twig, it anchors its case by strong silken cables to the naked side of a limb, and in this situation it has exactly the appearance of a piece of dry bird's dung. It may be thus described from the recent specimen: — Length .50 inch. Color greenish-brown, lighter beneath. Head and body both with long, sparse hairs. Head dull black, with fine, confluent punctures, and a slightly-impressed, longitudinal line divaricating in front. The first segment horny above, and an elevated, shining, black spot on each side of the second segment. Legs 16, normal.

With regard to the generic determination of this insect, Dr. Clemens, to whom I had sent specimens, wrote to me as follows: —

"*Phycita nebulo* Walsh is new to me and doubtless to science: it belongs to the family *Pyralidæ*, Group *Phycites*. The typical species, which Westwood describes under the genus Phycita, is now included in the genus Homalosoma, but the generic diagnosis of the latter does not corroborate that of Westwood. I do not understand why it is that the characters in Westwood correspond very well to those of this species, while the new group, as it now exists, is certainly quite different. I do not find any genus that corresponds entirely with *nebulo* Walsh. Acrobasis appears to come closer to it than any other: but I do not think it is identical. The next volume by Guenée will treat of this group, and in it we may find a genus which will contain *nebulo*." (Aug. 12, 1860.)

HETEROPTERA.

PHYTOCORIS LINEARIS Beauv. (= *Capsus oblineatus* Say.) infests apple, quince, and pear trees. (*Prairie Farmer*, about May 10, 1860, p. 308, and May 2, 1863, with figures.)

MICROPUS LEUCOPTERUS Say (Chinch-bug,) and its supposed four coccinellade enemies. (*Trans. Ill. State Agr. Soc.*, IV., pp. 346–9.)

REDUVIUS RAPTATORIUS Say, insectivorous. (*Prairie Farmer*, July 11, 1863, p. 21, with figure.)

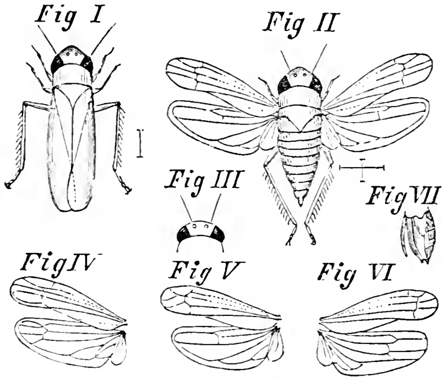
HOMOPTERA.

PROCONIA UNDATA Fabr. and its eggslits, on grape-vines. (*Prairie Farmer*, July 25, 1863, p. 53.)

ERYTHRONEURA TRICINCTA Fitch, on grape-vines. (*Valley Farmer*, Oct., 1862, pp. 305–6; with figures.)

TETTIGONIADÆ. Twelve new species. (*Prairie Farmer*, Sept. 6, 1862, with figures.) Eggslits of *chloroneura malefica* (?) Walsh, on apple twigs; (*Prairie Farmer*, April 4, 1863, p. 212, with figure.)

Fig. I., *Chloroneura* (n. g.) *malefica* Walsh; fig. II., the same with expanded wings. Fig. III., head of *Chloroneura maligna* Walsh. (These two insects supposed to be the causes of the well-known "Fire-blight" on the apple and pear.) Fig. IV., Typhlocyba, § B. Fig. V., Empoasca (n. g.) Fig. VI., Erythroneura Fitch; fig. VII., its ovipositor, in profile.



N. B. The lines annexed to the figures show the length unmagnified.

All the insects hereinafter referred to belong to the extensive genus *Typhlocyba* of Germar, which comprised, in 1838, no less than thirty British species. Dr. Fitch reckons up fifty-eight species found in the State of New York; my private cabinet contains over forty-five *Illinois* species belonging to this genus, and it is not at all improbable that there are as many as two hundred and fifty in the whole United States.

Dr. Fitch remarks that "the number and arrangement of the veins in their wing-covers and wings present such differences as would probably have induced authors to separate them into distinct genera, had they been of larger size and better known." He then proposes the following subdivision into genera, or subgenera, and observes that each of them "admits of further division," and that, "as a matter of convenience, a separation is required."

"*Typhlocyba.* Wing-covers bordered on the hind part of their inner side by a submarginal vein, running parallel with the exterior edge, and commonly having a closed discoidal cell also. [See fig. IV.]

"*Empoa.* Wing-covers not bordered, their outer apical cell three-sided, or with a single acute angle at its forward [*i. e.* basal] end. [See fig. V.]

"*Erythroneura.* Wing-covers not bordered; their outer apical cell four-sided. or with two right angles at its forward [*i. e.* basal] end." (See fig. VI.) *N. Y. Reports Inj. Ins.*, Vol II., § 104.

This division, as will be noticed, is founded exclusively on the neuration of the elytra. On examining the wings as well, it will be found that two distinct types of neuration exist in each of the last two genera, the terminal cells being bordered in some and not bordered in others, and the median vein being in some unconnected with the submedian by any cross-vein, and in others being distinctly so connected. (Comp. figs. V. and VI.) These differences appear to be of higher generic value than that which separates *Empoa* from *Erythroneura*, and will necessitate the establishment of two new genera. The following synoptical table will exhibit the arrangement at a glance.

Ocelli equidistant from the eyes and from each other, placed near the anterior margin of the head, which margin is rounded, not angulated; elytra indistinctly veined, with four distinct terminal cells; posterior tibiæ with a double row of spines.	Elytra bordered by a vein on the inner terminal margin.		a discoidal cell. .	*Typhlocyba*, § *A*
			no discoidal cell.	*Typhlocyba*, § *B*.
	Elytra not bordered.	Outer apical cell of elytra triangular.	Term'l cells of w'gs bordered. . . .	*Empoasca*, n. g.
			Term'l cells of wings not bordered. . .	*Empoa*.
		Outer apical cell of elytra quadrangular.	Term'l cells of w'gs bordered. . . .	*Chloroneura*, n. g.
			Term'l cells of wings not bordered. . .	*Erythroneura*.

Of these six divisions, the five last all comprise species of about an eighth of an inch in length, and of a uniform pale greenish or yellowish color, with scarcely any markings. These I propose to describe, as they are liable to be confounded with the two foes of the apple and pear. Where specific characters are almost entirely wanting, descriptions of species must necessarily be brief.

TYPHLOCYBA. § B. (Fig. IV.)

Typhlocyba aurea (n. sp.) Golden-yellow, beneath pale, front of head forming the quadrant of a circle. Eyes, ovipositor, and tips of tarsi, brown. Elytra golden-yellow to the cross-veins, paler on the costal half; two middle cross-veins not dislocated, as they are in *Chloroneura* and *Erythroneura*: tips hyaline, extreme tips cloudy; wings hyaline. Length to tip of wings, a little over one-eighth of an inch. Occurs at Rock Island, Ill.

Typhlocyba pallidula (n. sp.) Differs from the preceding as follows: Body whitish above, yellowish beneath: ovipositor yellowish, elytra whitish-subhyaline, sometimes with a faint yellow vitta on the costal and interior margins. Occurs in Southern Illinois.

Typhlocyba binotata (n. sp.) Differs from *aurea* as follows: Body whitish, with a glaucous tinge. Thorax with two transverse dark dots on its anterior submargin. Sternum varied with fuscous. Dorsum of abdomen, except the extreme tip of each joint, fuscous; ovipositor unknown; elytra whitish-subopaque, except at tip. Occurs at Rock Island, Ill.

Empoasca. (n. g.) (Fig. V.)

Empoasca viridescens (n. sp.) Pale greenish. Front of head forming a right angle with the apex rounded off. Eyes and tips of tarsi fuscous; elytra subhyaline, with a faint greenish tinge, the triangular cell not peduncled as it is in fig. V.; wings hyaline. I met with both sexes in Southern Illinois. A single female, which occurred at Rock Island, Ill., varies in being more yellowish than greenish, and in the tip of the ovipositor being fuscous. Length to tip of wings, not quite one-eighth of an inch.

Empoasca consobrina (n. sp.) Differs from the preceding only in being sometimes yellowish, and in the triangular cell of the elytra being always peduncled. Seven specimens, taken at one time near Rock Island, Ill., all agree in this particular. Length slightly over one-eighth of an inch. [This is a mere variety of the preceding; I have now all the intermediate grades. B. D. W., 1863.]

Empoasca obtusa (n. sp.) Pale grass-green. Front of head forming a very obtuse angle, with the apex rounded off. Each ocellus surrounded by a fuscous spot. Eyes, and tips of the tarsal joints, fuscous; elytra greenish-subhyaline; tips hyaline. Triangular cell peduncled. Wings hyaline. Length to tip of wings, three-sixteenths of an inch.

Empoa. (Elytra, fig. V.; wings, fig. VI.)

Two species, one found on pine, the other on oak, are described by Dr. Fitch, in his Catalogue of New York Homoptera, and referred to this genus. As he says nothing of the neuration of the wings, they may possibly belong to *Empoasca*. *Empoa rosæ* and *E. fabæ* Harris, are in the same predicament.

Empoa albicans (n. sp.) Whitish. Eyes fuscous. Two or three of the basal and of the terminal joints of abdomen, fuscous at tip; ovipositor black; elytra subhyaline, at tip a little cloudy; triangular cell peduncled; apex of vein which forms the inner cell not attaining half the distance to the apex of elytrum; wings hyaline. Length to tip of wings, nearly one-fifth of an inch.

Chloroneura. (n. g.) (Elytra, fig. VI.; wings, fig. V.)

Chloroneura abnormis (n. sp.) Pale dull-green. Front of head forming an angle of about eighty degrees, with the apex rounded; antennæ and eyes fuscous; vertex and thorax, with two sanguineous vittæ, more or less obsolete. Abdomen black, except the tips of the joints; the last joint almost entirely greenish. Tips of tarsal joints dusky. Elytra, toward the base, subopaque, dull-greenish; at tip subhyaline; an obscure sanguineous vitta on the anal vein, and another parallel to it, half-way to the costa, both sometimes obsolete. Wings whitish-subopaque, with the tips of the costal veins fuscous; the cross-vein forming a salient angle, and emitting from its apex an additional vein, as in *Typhlocyba* (fig. IV.) Length to tip of wings, three-twentieths of an inch.

Chloroneura malefica (The culprit leaf-hopper.) (n. sp., figs. I. and II.) Greenish or yellowish. Front of head forming a right angle with the apex rounded. Eyes and tips of tarsi fuscous. Elytra subhyaline, with a greenish tinge; at their extreme tip, cloudy. Wings hyaline, cross-vein simple. Length to tip of wings, one-eighth of an inch. Occurs on apple and pear leaves. Took a pair *in coitu* under bark, early in the spring, in the woods.

Chloroneura maligna. (The malignant leaf-hopper, fig. III.) Differs from the above as follows: — The color is deeper; the head is almost transverse, its anterior edge forming about half a quadrant; the elytra are subopaque, and deeply tinged with green, and their anal vein attains the cross-vein nearly.

Erythroneura. (Fig. VI.)

To this extensive genus belong *Tettigonia obliqua* Say, *T. basillaris* Say, *E. vitis* Harris, *E. vulnerata* Fitch, *E. vitifex* Fitch, and *E. tricincta* Fitch, all of which occur near Rock Island, Ill. Also, nineteen undescribed species, most of them elegantly marked with blood-red or blood-brown, which I have met with in the same locality. I describe only the three following, one on account of its liability to be confused with the two species which infest the apple and pear, and two on account of their infesting the grape-vine.

Erythroneura australis (n. sp.) Pale yellowish. Head forming a right angle with the apex rounded. Eyes and tips of tarsi fuscous. Elytra subhyaline, with a pale, fuscous dot on the basal side of each of the three inside terminal cells, the two outer dots sometimes obsolete. Wings hyaline. Length to tip of wings, one-eighth inch. Very near *Empoa quercius* Fitch, but generically distinct. Occurred in Southern Illinois; a single specimen near Rock Island, Ill.

Erythroneura ziczac (the zigzag leaf-hopper.) (n. sp.) Pale yellowish. Front of head in a right angle with the apex rounded. Eyes dusky; ocelli pale; vertex, with two pale sanguineous vittæ, generally subobsolete. Thorax blood-brown, yellowish in front, often with a yellowish vitta; scutel blood-brown, with a yellowish vitta, occasionally entirely yellowish. Abdomen often blood-brown, except at base and tip. Tip of ovipositor and of tarsi dusky. Elytra pale yellowish; on the middle of the costa an oblique rhomboidal black spot; on the costal tip a black dot, and on the interior margin, forming a triangle with the other two spots, a black spot; a blood-brown, irregular, broad stripe, covering the humerus, thence running to the interior margin; thence, in a zigzag direction, to the rhomboidal spot; thence to the spot on the interior margin: thence not quite attaining the terminal dot. Wings hyaline; tips of costal veins often dusky. Length to tip of wings, a little over one-tenth inch. Occurs abundantly on the grape-vine.

Erythroneura octo-notata (the eight-spotted leaf-hopper.) Whitish. Head as in the preceding. Thorax a little clouded with fuscous. Abdominal and ventral joints, in mature specimens, dusky, except at tip. Tips of tarsi dusky. Elytra whitish-subhyaline, with the same three spots as the preceding, and, in addition, one on the inner margin not far from the base; on the cross-veins, an irregular fuscous band, and on the disk a small brown cloud, often obsolete. Length a little over one-tenth inch. Occurred sparingly on the grape-vine, along with a few *E. vulnerata* Fitch, and numerous specimens of the preceding, and of *E. vitis* Harris, and *tricincta* Fitch. Dr. Fitch has suggested that these last two species may be mere varieties. I have examined some dozen specimens of each, and find that there are no intermediate grades.

It may, perhaps, be worth while to add, that on the grape-vine where these *Erythroneuræ* were swarming, I noticed a small and rather rare dipterous fly, the *Hemerodromia superstitiosa* of Say, very busily engaged. I caught him and put him in my collecting bottle, along with a number of the leaf-hoppers, and shortly afterwards saw him approach one slyly, stick his beak into it and suck it to death, without previously using his long raptorial front legs." (*Prairie Farmer*, Sept. 6, 1862, with the figures given above.)

Aphis Maidis? Fitch, infests the roots of young Indian corn, as well as the stems of the roasting ears. (*Jour. Ill. State Agr. Soc.*, Sept., 1862, pp. 8–13, with figures.)

Coccus Harrisii Harris. (*Prairie Farmer*, May 10, 1860, p. 308, with figure.)

Rock Island, Sept. 2, 1863.

Capt. N. E. Atwood, of Provincetown, gave some interesting statements relative to the Cod Fishery of our coast. In response to a question of Mr. Putnam, he said he thought the Cod of the Newfoundland Banks to be distinct from that of Massachusetts Bay, and remarked, that upon the Banks the fish spawned in the latter part of April and early May, while here the spawning season was in December.

Mr. Putnam said that his study of the Cods had led him to consider that those found at the Banks and northward belonged to the European species, while the American Cod was the only one found in the waters of Massachusetts.

Mr. C. Stodder exhibited a specimen of Diatomaceous earth, with a slide of the same under the microscope. The specimen was from the land of Mr. D. Faxon, in Randolph, Mass., found under the following conditions: —

The surface of the country is gently undulating. There is slight depression, with a level tract in the centre, nearly circular, of about one hundred feet diameter, apparently like any ordinary New England meadow, flooded with water; but, on walking on to it, it is found, unlike flooded meadow lands, to be not soft and miry, but nearly as firm and hard as the surrounding dry land. The surface is covered with grasses and turf two to three inches thick. Immediately below that is found the material exhibited, which has in one spot been excavated to the depth of ten feet without finding the bottom of it. It contains vegetable matter, a few fibres, to the amount of five or ten *per cent.*; the remainder is entirely organic, nearly all whole or broken frustules of Diatoms, with some spicules of sponges. Not one particle of sand or other inorganic matter has been discovered after the strictest search with the microscope.

The Diatoms as yet have presented no species of particular interest. The genus Himantidium is most abundant; next, Linularia and Stauroneis. No attempt has been made to make any list of species found, as all are common in thousands of sub-peat deposits in New England. It would be a matter of interest to know if the species are the same at different depths from the surface: but no opportunity has yet been afforded for that, nor is it known from what depth the specimen examined was taken.

Under what conditions could this enormous accumulation of Diatoms have been deposited? An examination of land in the immediate vicinity, has given the clew to a probable explanation. As already stated, the locality is a slight depression from the general surface around. There is a very small stream of water running into and through it. The outlet is through a ridge of drift gravel, and has been artificially deepened some five feet since the settlement of the country. Before this lowering of the outlet, the place must have been a pond, with some four to five feet of water above the present surface. The small stream running into it comes from some twenty or thirty acres of meadow, from a hundred yards to a quarter of a mile distant, and a few feet (less than ten apparently) higher level. Now the pond, when it existed, was too deep for the growth of peat-forming plants, and not favorable for the growth of Diatoms in any large quantity. But the meadows above were, particularly before the cultivation of the country, and the introduction of artificial drainage, most favorable for the growth of Diatoms. The sluggish stream draining the meadows would have force enough, especially in floods, to wash out the Diatoms, and not enough to move sand: neither could the meadows supply sand. When the Diatoms reached the pond, they would of course settle to the bottom; for the mass of water in the pond being so great in proportion to the supply there would be no perceptible current in it. In fact, it was a perfect natural trap for the Diatoms, in principle exactly like the process used for separating Diatoms from sand and other coarse material, in mounting for the microscope. The course of the little stream running into the pond, is for a few rods through a ridge of drift material. This undoubtedly furnished some sand and coarse material, but it would be deposited almost immediately on entering the quiet water of the pond, and undoubtedly it will now be found directly against the entrance of the stream.

After the examination of this place, the conclusion must be that this deposit has been forming ever since the close of the drift period, when the surface of the earth received its present conformation.

The Chairman announced the sudden death of Dr. George Hayward. He was one of the members of the old Linnean Society, and, when that dissolved, became one of the active founders of this Society, was one of its earliest Vice-Presidents, and had always taken a deep interest in its progress.

The following letters were read, which had been recently received, viz: —

From the Naturhistorische Gesellschaft zu Hannover, March 1st, 1863, from the Natural History Society of Dublin, August 5th, 1863, and the Société Entomologique de Belgique, Bruxelles, August 31st, 1863, asking for an interchange of publications. From Francis W. Lewis, M. D., Philadelphia, May 22d, 1863, Dr. John J. Craven, U. S. V., Hilton Head, June 24th, 1863, and Dr. William O. Ayers, San Francisco, July 24th, 1863, acknowledging their election as Corresponding Members.

Mr. C. T. White was elected a Resident Member.

October 21, 1863.

The President in the chair.

The following communication was presented: —

Notes on Selandria cerasi Harris, as it occurs at Ann Arbor, Michigan. By Professor Alexander Winchell.

[Condensed, with a few additions, from a paper read before the Michigan Scientific Association, June 24, 1863.]

This destructive insect made its first appearance at this place in 1859: its depredations were, however, not generally observed till 1862, when it caused the death of many fine cherry-trees. Its increased ravages during the present year have attracted general attention, and induced the writer to extend his observations previously begun, and to determine what relations exist between the Michigan insect and that described by Peck and Harris.

The fly commenced to deposit its ova the present year on the 5th of June. It selected for this purpose the leaves of the pear and cherry; though, in the course of the season, it was observed that the mountain-ash and the plum had also suffered to a limited extent. The ova were deposited through rectilinear incisions in the epidermis of the upper side of the leaf; and the chlorophyl, for a small distance around each egg, was changed to a brown color, and deadened, giving the leaf, where the eggs were numerous, a strongly mottled appearance. Trees in open situations were most infested; and the outer portions of the foliage of a tree were preferred to the more shady.

The ovipositor is attached at a distance of .025 of an inch from the extremity of the body of the female. When at rest, it is lodged in a slit which reaches nearly to the tip of the abdomen. It has the form of a butcher's knife, a little bent upwards near the point. Toward the other extremity, the organ is curved in the opposite direction into a right angle with the main axis, and is furnished internally with a couple of apophyses for the attachment of the muscles which move the instrument in the execution of its office. The upper margin of each blade is worked into a series of low, sharp teeth, turned from the point of the blade; the lower side is furnished with a series of erect teeth, whose margins are themselves serrate. The muscular action which moves this instrument thrusts it entirely through the leaf, cutting with the serrated teeth of the lower side as it enters in the act of being drawn; while the backward turned teeth of the upper margin do the same work while the instrument is being withdrawn, and resuming its place in the slit. The straight gashes made by the ovipositor can be invariably seen on the under side of the leaf, close by the position occupied by the egg. The length of the ovipositor, to the internal bend, is .042 inch; and its width, .001 inch.

The habits of these saw-flies are sluggish. In damp or even cloudy weather, they stand motionless on the under sides of the leaves. When approached by the hand, they are apt to drop as if dead, and thus escape. They never, in such weather, attempt to fly away. In sunny weather, they may be seen on both surfaces of the leaves; and, on taking alarm, will sometimes fly away. The insect is willing to alight on the leaf of any tree, but makes a strict selection in depositing its ova.

These flies were first observed on the 5th of June. By the 8th, they had apparently diminished in numbers; on the 9th, they were moderately numerous, and active on some of the trees; on the 10th, very few were to be found; on the 11th, none. Nevertheless, one or two were observed near the close of June, and one or two in July.

The following observations were made on the development of the embryo: —

June 7. The ovum is .03 of an inch in its longer diameter, and .014 in its shorter. The form is a prolate ellipsoid, flattened on one side. The contents are simply granular.

June 8. Under a power of 230 diameters, the contents of the egg-cell consist simply of small globules, the whole mass of which, under a compressor, seems to be divided into large irregular areas. On certain sides, also, are presented some inequalities, like convolutions, as if the embryo were beginning to receive shape.

June 9. The embryo can be discerned doubled together, and presenting already distinct traces of articulations.

June 10. Embryo appears clearly as an articulate, doubled together with its back next the periphery. The place of the eye is a dark-brown spot. The oral organs are clearly developing, and the legs are beginning to protrude in distinct sacs. When slightly compressed, the vitelline membrane bursts, and the traces of organization dissolved at once into a multitude of granules floating in a watery fluid.

June 11. Pedal protuberances well developed, and claws beginning to appear. The head distinctly isolated from the body, and the oral apparatus quite distinct; at intervals, also, the embryo squirms in its nidus, and occasionally a single foot protrudes and retracts itself.

June 12. Movements of the embryo frequent. Aortic contractions quite regular, at the rate of 30 per minute: occasionally they intermit for a minute or two. The contractions are always seen immediately after the efforts at motion.

June 13. Embryo appears stronger, and makes more energetic motions. The claws of the true legs are pretty well developed. The contractions of the dorsal vessel are less violent than yesterday; have increased to 55 per minute; and can be traced through half the length of the embryo. I could not, under any circumstances, detect any movement of a circulating fluid. Bristles begin to appear on the feet, and the pro-legs are developed. The tracheary system is faintly marked out in the vicinity of the head, though the coiled spring could barely be discerned in one of the largest trunks. A mysterious vitality inheres in this forming organism, as the following experiment shows. The egg was put under the compressor, and pressed till the outer membrane burst, and the tail of the embryo was extruded: in this condition, the contractions of the dorsal vessel increased to 80 per minute. On further compression, the contractions near the head were 68, and near the tail 144, per minute. On still further compression, the contractions near the head remained the same; while those near the tail occurred by threes, in which the beats were very quick. The compression was increased as far as the thin glass could allow: the embryo was completely crushed, and its parts extruded in every direction; and yet, where the dorsal vessel lay, the wonderful struggle to perpetuate existence was kept up to the end.

June 14. The ova are beginning to hatch. The slug cuts a semicircular slit through the membrane of the egg and the epidermis of the leaf, forming a lid, which folds back, and allows it to escape. One slug, which had not moved its own length from the trap-door through which it emerged, was .06 of an inch in length. In form, the young slug slightly increases in width from the tail to the region of the head, where it exhibits a considerable enlargement. The head is black, and habitually curled under the shoulders: it is furnished with a powerful pair of serrated mandibles. The eyes can be seen, under pressure, as a pair of small round, clear globules; in front of which is a pair of oval semitranslucent spots. The feet are provided each with a bifid claw and several short bristles. The pro-legs are truncate, smooth, and retractile: a few bristles are seen scattered in clusters of two and three over the exterior, and they become more numerous at the posterior extremity. The external surface is transversely wrinkled, and covered with a small amount of watery slime. The young slug is nearly transparent, but having a pale, olivaceous hue, with a dark spot at one extremity produced by the head, and another at the opposite extremity caused by an accumulation of fecal matter.

The alimentary canal in the new-born larva is by far the largest vessel in the animal. It swells out to its largest diameter just behind the head, and somewhat irregularly tapers toward the hind extremity, near which it is much contracted. In this part of the slug, numerous faint, parallel, longitudinal lines can be seen, which are perhaps muscular fibres, related to the excretory apparatus. The vermicular action of the alimentary canal is constant and rhythmical.

The dorsal vessel is next in size. It can be traced to the region just behind the head, where it shows a disposition to curve downwards; though neither here, nor at the opposite extremity, could I detect the continuity between this vessel and the recurrent vessels or streams.

The ventral or recurrent streams are at least two in the middle region of the larva. There are all the usual indications of vascular walls; but the general doubt entertained amongst anatomists, as to the existence of such walls in any insects, causes me to withhold the allegation of their occurrence here. Posterior to the middle region, these streams pursue a somewhat convoluted course, but do not assume any thing like the sinus-disposition seen in certain worms: the circulating fluid could be distinctly traced, flowing backwards with an irregular movement through nearly the whole length of the larva.

The tracheary system is beautifully distinct. Stigmata occur along the sides at points corresponding to the feet and pedal swellings, and connect by large trunks with a somewhat sinuous longitudinal vessel, which runs from the head quite around the animal, being somewhat reduced in size in the neighborhood of the hinder extremity. These longitudinal trunks are connected, in each segment, by a single transverse trunk; but, in the segments which bear the three pairs of feet, the transverse trunks are in pairs. From the trunks arising from the stigmata, but especially from the longitudinal trunks, arise branches which ramify throughout the body. The transverse trunks are also somewhat branched.

No trace of a nervous system was detected.

Immediately after the slug escapes from the egg, it begins to feed upon the green pulp of the leaf, and thus by degrees covers the leaf with small, round, faded spots. The brood began to attain the full growth and to disappear about the middle of July. It would seem that their retirement to the chrysalis state may be somewhat hastened by external circumstances. The stem of a small dwarf pear-tree, which had been completely denuded by these depredators, was seen to be covered with slugs of various ages, all alike winding their way toward the ground. Dozens of the larvæ were seen already squirming upon the surface of the soil. The next day, all had disappeared.

The autumn brood of our cherry-slug may be regarded as a complete failure; the fly barely making its appearance early in September, and the slugs being scarcely discoverable.

This saw-fly, in reference to which I have offered some facts which I have not found on record, differs as much from the slug-fly of Boston as that does from the *Selandria æthiops* of Europe: whether the three forms are to be regarded as specifically identical, will depend somewhat on the views entertained as to the variability of species. The points of difference thus far observed between our insect and that described by Harris are as follows: —

1. In Harris's insect, the ova are deposited in *semicircular* incisions: in ours, they are in *straight* incisions.

2. In Harris's insect, the eggs are generally on the *under* side of the leaves: in ours, they are always on the *upper* side.

3. In Harris's insect, the embryo escapes on the *fourteenth* day: in ours, on the *eighth* or *ninth*.

4. The first two pairs of legs in the adult insect are not nearly so light colored as in that described by Harris.

5. Perhaps the almost complete failure of the autumnal brood deserves to be mentioned in this connection; though this might be due to a changed climate, as it is well known that the reproduction of many species is materially influenced by climatic conditions. It may also be added, that, unlike the Boston slug, ours emits no odor; and that, contrary to the statement of Norton,* from three to a dozen individuals may generally be found on each leaf, in those parts of the tree that have been visited by the fly.

As to the remedy for this horticultural pest, it may be added to what has been already published, that the odor of coal-tar effectually drives away the fly. This can be smeared over a piece of board, and suspended in the tree, — a resort which I have found effectual against the plum-weevil. It is likely that the odor of petroleum or naphtha would produce similar results.

Contrary to the conjectures of Harris, this disgusting larva is never eaten by birds.

University of Michigan, 15th October, 1863.

Mr. F. W. Putnam exhibited a young fish from the Gulf Stream, near the Bahamas, presented by Mr. S. N. Chamberlin, stating that it was a very interesting specimen of the genus *Belone*. This was the first time, so far as he was aware, that the young of this genus had been seen. The young specimen was perfectly formed, so far as the body was concerned, except that the scales were not developed. The sides of the body were very beautifully marked with dark stellate spots. The upper jaw was very thin and curved, not reaching to the tip of the under jaw, which was slightly hooked at its tip. The teeth were developed. The short upper jaw recalls the genus Hemiramphus.

* Proc. Bost. Soc. Nat. Hist., Oct. 1861, p. 222. Harris states, however, that sometimes twenty or thirty may be seen on a single leaf (Insects Inj. to Veg., 1862, p. 530).

Prof. L. Agassiz remarked, that, during the past summer, he had been examining the young of many species of fish, especially during the last hours of their embryonic life, or after hatching; and had found that these animals undergo metamorphoses as varied and extensive as are so well known in Batrachians.

Mr. F. W. Putnam stated that different families of fishes differ very much as to the time of appearance of the scales in the young, details in regard to which he would give on some future occasion.

Mr. Alex. Agassiz made a detailed communication upon the transformation of the young in Echinoderms, showing how the young star-fish is developed upon the water-tubes. The differences in the modes of development in the different orders were pointed out, as well as the relation which the gradation of the structure in these animals bore to the different aspects assumed by the young, after the preparatory framework had been dissolved by the larva.

Dr. J. C. White exhibited to the Society two albino children.

Prof. Agassiz announced a donation to the cabinet of the Society, from the Museum of Comparative Zoölogy, of a collection of fishes, containing 345 specimens, representing 108 species, all determined and labelled by Mr. Putnam.

Dr. Francis H. Brown noticed the capture off Saco, Me., in September last, of a specimen of *Sphargis coriacea.*

The dimensions, according to Mr. G. W. Jebbs, are as follows: Length, eight feet; extremes, from end of flippers, ten feet; neck, three feet nine inches; girth, seven feet eleven inches; weight, 1,280 lbs. The occurrence of but three others on our coast had fallen under his notice: one, described by Dr. Storer, taken in Massachusetts Bay in 1824, brought to Boston and purchased by the proprietors of the New-England Museum; a second, noticed by Holbrook as caught in Chesapeake Bay in 1840; and the third, caught near Cape Cod in 1848, and now in the Museum of Comparative Zoölogy at Cambridge. Prof. Agassiz, in his "Contributions," can make out but nine instances of its known occurrence in the waters of Europe.

Mr. W. G. Binney stated that he had received, from a gentleman connected with the Army of the Cumberland, a species of mollusk which had the shell of *Melania*, with the operculum of a true *Melantho;* and he was led to suspect that many of the species which had been described as belonging to Melania would prove to be Melanthos on examination of their opercula. In alluding to the erosion of shells, Mr. Binney stated that he had seen Melanias, which he had kept in confinement, eating the apices of their own shells.

Dr. Gould said that he had seen a similar case in our Lymnæas, but remarked that this was by no means a satisfactory explanation of the erosion in all mollusks, as, for instance, in Unios; and it was noticeable that no erosion took place among the shells living on coral reefs, or in fresh waters well saturated with lime.

Dr. Pickering stated that erosion took place, to a remarkable degree, in the shells found in warm springs.

Mr. A. E. Verrill presented specimens of *Matricaria inodora* (Pyrethrum inodorum Hooker) and *Sedum rhodiola* from the vicinity of Eastport, Me., neither of which have before been considered as belonging to the flora of the United States. The first was found in considerable abundance along the roadsides at Eastport, and also at Grand Menan: its previous localities were Lake Huron (Dr. Todd), York Factory (Drummond), and northward to Great Bear Lake (Richardson). The second species was found growing on the high, trappean cliffs at Quoddy Head, the extreme eastern point of the United States. It has long been known upon the neighboring islands of Campo Bello and Grand Menan.

Mr. Alpheus Hyatt was elected Curator of Conchology.

November 4, 1863.

The President in the chair.

Mr. A. E. Verrill read the following Notes on the fertilization of Cypripedium spectabile Swartz, and Platanthera psycodes Gray, by S. I. Smith of Norway, Me.: —

Cypripedium. *July* 4. — After examining many flowers, and watching them for some time, I came upon a bunch which was almost covered with numbers of a minute flower-beetle, apparently attracted by the nectar-like fluid that moistens the long hairs which line the labellum: these beetles were crawling over the flowers in every direction; and presently one crawled from one of the lateral petals up the column, over one of the pollinia with some difficulty, and out upon the stigma. This was repeated three or four times by different individuals; some of them returning by way of the column, others passing over the sterile stamen on to the labellum. Several beetles passed from the lateral petals down the labellum, without touching the pollinia or the stigma. Only two beetles were seen to alight upon any of the flowers: one of these went into the labellum, without touching the pollinia or stigma; the other passed over both.

Nearly all the beetles, when examined with a lens, were found to have little masses of pollen attached to them; and many could scarcely walk for this reason. Most of the flowers upon which the beetles were found had been fertilized, and, under a strong lens, showed minute particles of pollen among the sharp-pointed papillæ with which the stigma is beset.

Of many flowers from different places, nearly all had had the pollen removed in minute particles from the anther to the stigma; but, in two or three instances, the pollen had been removed in one mass as if by some large insect.

Platanthera. *Aug.* 6. — While watching some of these Orchids in a meadow, a Sesia — it proved to be S. Thysbe Fabr. — came to them, and began to suck the nectar while poised on the wing. I attempted to catch it; but it flew to another spike, where I watched it for nearly a minute, while it visited more than a dozen flowers. It commenced at the bottom of the spike, and, proceeding spirally upward, sucked the nectar from each flower in turn. I caught it, and found about thirty pollinia attached to its proboscis near the base: they were all in a space of less than a tenth of an inch in length, and much crowded. Those nearest the base of the proboscis were entirely whole, and seemed to have lost none of their pollen: those nearest the tip of the proboscis had lost much of their pollen by contact with many viscid stigmas. The stigmas of nearly all the flowers on the spike had pollen sticking to them.

Soon after this, I took a Papilio Asterias, with a number of pollinia attached to its proboscis.

Aug. 10.—While watching a number of plants of P. psycodes, a Sesia—this time it proved to be S. diffinis Boisd.—came to them, and sucked the nectar from every open flower on one spike: it then flew to another plant, and visited all its flowers in the same way. As the moth withdrew its proboscis from each flower, I could plainly see the pollinium pulled from the anther-cell. Several times both pollinia were taken from one flower, one pollinium sticking to the proboscis a little above the other. When caught, this moth had about twenty pollinia attached to its proboscis in the same manner as in the last instance.

Both of these moths and the Papilio had their probosces so encumbered with the pollinia, that it was impossible for them to be coiled up between their palpi.

The shortness of the time occupied in the depression of the pollinia in this species, and the time that the insects remained at one plant, would seem to indicate that the upper flowers on the spike, at least, were fertilized by pollen from the same plant.

I have frequently seen the orthopterous insect Phaneroptera curvicauda Serv. feeding upon the flowers of this orchid; but could not find that they ever effected its fertilization in any way, although pollinia were several times found attached to its feet.

Mr. Alexander Agassiz stated that he had noticed, in watching our sea-urchins, that the excrement ejected from the anal opening upon the upper surface of the body moved down the sides by regular paths until it dropped. Examination showed that this effect was produced by the action of the inter-ambulacral pedicillariæ, whose office it seemed to be to perform this function: none of the ejectamenta were ever seen upon the ambulacral spaces, except occasionally at the edge; in which case, constant exertion seemed to be made to free these parts of such a burden.

Dr. B. Joy Jeffries, in alluding to the two albino girls that were present at the last meeting of the Society, stated that they were the same that were exhibited at the Aquarial Gardens in the spring of 1860. They were also then shown to the Society, and some account of them was given by Dr.

Kneeland, the Society's Secretary, in the "Boston Medical and Surgical Journal," Nov. 13, 1860.

They were born in the State of New York, of perfectly black parents: between them was born one black child. The parents had also several other black children, and one other female albino, that died young. They are now about of the ages of seven and ten, and may be considered as perfectly well-formed and well-developed children, with the exception of an entire want of pigment in any of those portions of the body where Nature deposits it.

When they were in Boston before, I had an opportunity of examining the interior of their eyes with the ophthalmoscope. A report of this examination will be found appended to Dr. Kneeland's remarks in the "Medical Journal." I again had opportunity of an ophthalmoscopic examination on the afternoon of the day they were shown to the Society: as this was three years and a half since the previous one, and more successful, it is of some interest.

The children have developed well both mentally and physically. The younger girl is, however, the stronger and more healthy: her vision, and tolerance of light, is also proportionably better: this has always been the case. Both children are near-sighted, apparently not from amblyopia, but from the natural conformation of the eye. Their power of vision, and tolerance of light, had so much increased, that some deposit of pigment amongst the choroidal vessels was anticipated: none, however, was found. The pupils were circular, and acted quickly under the influence of light; the iris, of a light-blue color from the blood in its vessels, appearing darker than it really is by the shade thrown upon it, particularly in a side-light, by that portion of the sclerotic which projects forward beyond its outer edge or attachment. The eyes, after a few seconds of steady gazing, commence to oscillate laterally: this has evidently been somewhat overcome; for it rendered the previous examination very difficult. The pupils were not dilated artificially: the light used was about equal to a common fish-tail gas-burner. In the previous examination, a single candle was used; and it was all the light that could be borne. The ophthalmoscope used was the same as used before, — Professor Edward von Jäger's, — with the "weak reflector," composed of three plain surfaced pieces of thin glass laid together. The examination was made with the "upright image," requiring "concave 6" for my normal eye. The amount of light did not cause the pupil to contract enough to prevent a pretty fair view of the choroid, retina, and optic-nerve entrance with its veins and arteries. The accommodation-power was active. The appearances were those a perfectly normal eye, entirely deprived of its pigment, would give, and such as is in part sometimes given by a diseased eye when its choroidal pigment and "internal pigment layer" have been broken down and absorbed or displaced. The bottom of a normal eye appears through the ophthalmoscope a darker or lighter shade of red, simply because we throw sufficient light into it, and are enabled to receive the rays that are reflected back through the retina from the choroid. The albino's is the same eye deprived of pigment: and thus, the light being allowed to shine through the iris and sclerotic, we see the choroid through the pupil of a pink color; and hence the popular saying, that albinos have pink eyes. The same is true of white rabbits. We sometimes get a reflection from the bottom of some human eyes under certain angles of light, dependent upon the relative position of observer and observed: this, as it is uncommon, is considered unnatural.

These children were not of sufficient age to ascertain accurately the degree of near-sightedness, some questions as to the circles of dispersion, and other points of physiological interest, &c. I asked the person in whose charge they were to try the effect of some covers or blinders made of thin gutta-percha, with a horizontal slit in imitation of the snow-blinders used by the Esquimaux, which I had made for some other albinos; who, however, from prejudice, would not wear them.

Since these children were first in Boston, there have been three albinos exhibited here, — a man, and his wife and child. I believe there was no doubt that this was their relation. It would set at rest the question raised in the books, whether perfect albinos are capable of perpetuating their race *inter se*. No power of persuasion could induce these people to submit to an ophthalmoscopic examination of their eyes. It was somewhere stated that their pupils were square, instead of circular. I examined them carefully in reference to this point; and to me they were round, although in certain lights I saw that they *seemed* square. The child, a boy, was, I think, near-sighted: the ophthalmoscope alone could decide this; for the amblyopia from excessive light would induce the albino to hold a book near to the eye; and the contraction of the brows and partial closing of the eyelids are his means of excluding too great an amount of the rays from his retina, laid bare, as it were, by the absence of pigment.

The President, on behalf of the Building Committee, made a preliminary verbal report, to the effect that the new Society Building at the corner of Berkeley and Boylston Streets was nearly ready for permanent occupation; that the library-room, where the meetings were to be held, was entirely finished; and that enough storage-rooms were ready to accommodate the collections.

After a lengthy discussion, it was voted that the library be removed forthwith to the new building, and that the meetings of the Society be held in the new library so soon as the introduction of the gas would allow.

Messrs. Lyman Mason and William H. Dall of Boston, and Mr. A. S. Packard, jun., of Cambridge, were elected Resident Members.

November 18, 1863.

The Society met, for the first time, in their new and capacious building; the President, Dr. Jeffries Wyman, in the chair: 79 members present.

Mr. F. W. Putnam read the following letter he had received from Mr. James G. Shute:—

WOBURN, NOV. 11, 1863.

MY DEAR SIR:—

As I cannot be present at the next meeting of the Society, I would like to have you read the following observations on the mode of birth in the Opossum, made by me while in Beaufort, N. C., March 16, 1863.

During the delivery of the young, the parent lay upon the right side, with the body curved in such a manner as to bring the vulva nearly opposite the mouth of the pouch, which was opened, or drawn down, by contraction of the muscles, so as to receive the young when delivered. The young were seven in number. The time occupied in the delivery was about four hours. The parent remained in the same position about thirty-six hours, and refused all sustenance.

Immediately after the transfer of the young to the pouch, I removed one, by detaching it from the teat, in order to ascertain if the movement of the fœtus was instinctive. I found that it was at least partly voluntary, as it made an effort to regain its place in the pouch; and the same movement was made on the part of the parent to receive it as at first. I did not notice any use of the lips or limbs of the parent during the transfer. March 24, the parent was killed, and I put the young in alcohol. Yours truly,

JAMES G. SHUTE.

The President spoke of the value of these observations, and of the difficulties previously encountered in observing the transfer of the young to the pouch. Drs. Myddleton

Michel and Bachman's observations were by no means so complete, since they did not actually see what transpired, but only inferred what the method of removal was from what was noticed before and after the transfer.

Dr. Charles T. Jackson exhibited specimens of *Ceanothus americanus*, or Jersey Tea, recently announced by some speculators as the Chinese Tea-plant, growing on the old red sandstone districts of Pennsylvania; and also a copy of the charter of the American Tea Company.

Dr. Charles Pickering stated that he had recently found *Juncus trifidus*, an arctic and alpine plant, growing upon the top of Mount Monadnock, whose height had been given at 3,600 feet; while the upper limit of trees on the White Mountains was seldom if ever lower than 3,900 or 4,000 feet. He explained their living at so much less an altitude by the fact that the upper portion of Mount Monadnock is so rocky as not to allow of the growth of trees upon it, for want of sufficient soil, rendering the summit much less sheltered than similar wooded elevations would be.

Dr. Gray remarked, that the discovery of so peculiarly an arctic plant upon Mount Monadnock was quite unexpected. Grandfather Mountain, in North Carolina, of very much greater elevation (5,897 feet), was wooded to the summit, or with the exception of a very small peak, where only the alpine plants grew. Willoughby Mountain, near the Canada line, was much lower than Monadnock, but nourished quite a garden of subalpine plants. Dr. Gray thought that the only valid explanation of their presence was that which referred their origin to a time previous to the glacial epoch; these little patches being left in the only spots which still preserved an arctic character in their climate.

Mr. A. S. Bickmore exhibited to the Society a specimen of *Amphioxus* (Lancelet), which he had collected on Bird Shoal, a sand-bank off Beaufort, N.C., March 9, 1862, while digging for *Lingula pyramidata* during a very low spring tide.

The specimen was found in the sand, two or three inches below the surface; and was so active, that it escaped once, and was with difficulty captured a second time. Its color was milk-white, and the animal was transparent. Mr. Bickmore said that this was the second specimen only of this interesting genus that had been taken on our coast; the first having been found by Messrs. Stimpson and Gill near the same place.

Mr. F. W. Putnam said that the specimen exhibited seemed to differ slightly from the figures of the European species of the genus; but it would be impossible to decide upon the identity or non-identity of our species with the European until specimens are received from Europe with which to make the comparison. There have been several species of the genus *Amphioxus*, or *Branchiostoma*, described: among them is one from the West Indies, described by Sundevall under the name of *Branchiostoma caribæum.* Dr. Peters has considered this identical with the European species. The specimen found by Mr. Bickmore will very likely prove to be the same species as *B. caribæum.* Mr. Putnam thought that it was hardly possible for Branchiostoma to be the young of some Myzont, as has been suggested; as he did not know of any Myzont on our southern coast but the Lancelet.

Dr. J. Wyman gave an account of the results of his observations on the development of skates, and especially of *Raia batis.* The following changes were noticed: —

The vitelline duct, during early fœtal life, forms, in connection with the omphalo-mesenteric vessels, an umbilical cord, which, however, soon becomes shortened, so that, during the middle and latter stages, the fœtus rests directly upon the yelk.

The form of the embryo is at first eel-shaped, and then shark-shaped: before reaching its permanent form, the pectoral fins take on the proportions of those of *Pristis*, *Rhinobatus*, and *Squatina.* The dorsal fins are formed on the middle of the tail, but subsequently change their position to the end of it. In the Torpedos, and many other Selachians, this change of place does not take place. In recently hatched young of *Raia batis*, the tail is still prolonged beyond the dorsals, as is permanently the case in *Uraptera.*

Adult skates have no anal fin: the embryos of them, however, have a remarkably large and broad one, until the middle of their fœtal life, when it becomes atrophied, and wholly disappears. The branchial fissures are originally seven in number: the seventh closes up wholly; while the first is transformed into the spiracle, and is homologous with the Eustachian tube and the outer auditory canal of air-breathing animals. The nostrils first appear as simple depressions in the integument, at a distance from the mouth; and the curious flap between them is the result of the thickening of the intervening skin. This, as Professor Agassiz has pointed out, very closely resembles the intermaxillary bud of the embryos of the higher animals.

The yelk, as in birds, is wholly withdrawn into the abdomen, at about the time of, or soon after, hatching. Recently hatched skates were found with a very small portion of yelk still protruding, and others not hatched had the yelk in very nearly the same condition.

The Librarian called attention to the botanical library bequeathed to the Society by the late Dr. B. D. Green, now for the first time upon our shelves; stating that it was far richer than was supposed, and that Mrs. Green had more than carried out the liberal intentions of Dr. Green in the addition of many works of rare value.

Dr. J. C. White asked the attention of the Society to several of the skeletons from the menagerie collection, recently mounted by Mr. Sceva; and stated, that, when the work before Mr. Sceva was accomplished, the Society would be in possession of the finest series of mounted skeletons in the country.

Dr. A. A. Gould stated that the Record Book of the Linnæan Society of New England had recently come into his possession; and he proposed to deposit it in the archives of this Society, accompanying his gift with the following epitome of the Records: —

Entering, as our Society now does, upon a new phase of its career, it may be deemed a fitting occasion to take a retrospective glance at the beginnings, the *primordia* and *incunabula*, of natural history in this region. Up to the last fifty years, no one, so far as I can ascertain, had given any attention to the subject, sufficiently, at least, to entitle him to be called a naturalist. The most important exception was the Rev. Manassah Cutler, who published quite a comprehensive and scientific paper in the "Memoirs of the American Academy," vol. i. pp. 396–494, entitled "Account of some of the Vegetable Productions naturally growing in this Part of America, botanically arranged." This, with some treatises on the medicinal properties of herbs, some investigations into the natural history of the Bible, Mather's "Magnalia," Harris's "Natural History of the Bible," Thacher's "Dispensatory," and a few scattered papers of similar character, comprise them all. We might, perhaps, except also the renowned Dr. Benjamin Waterhouse, who seems to have brought with him from Holland some general notions of systematic natural history: at least, he published a pamphlet, of which I have a copy, entitled "Heads of a Course of Lectures on Natural History," Cambridge, 1810, in which he distributes the lower animals under the heads of Ornithology, Amphibiology, Ichthyology, Insects, and Vermes; which latter are pronounced to be "the outskirts of animated nature, extending to the confines of the vegetable world." In a note, he says he will extend, contract, or omit parts of his programme, to suit his audience; and it does not appear whether or not he ever had any audience at all.

Prof. W. D. Peck occupied the chair of Natural History at Harvard College from 1805 to 1822, when he died. He gave such instruction as was demanded, which was very little; and wrote some practical papers for the Agricultural Transactions, the more important of which were the natural history of the "Slug-worm" and of the "Canker-worm." Previous to the year 1814, no combined systematic effort had been made for the promotion of natural history in this State. In December of that year, a Society was duly formed for this purpose. It flourished for a few years, and then collapsed. Few of the present day are aware that such a Society, the Linnæan Society, ever existed here; and the memory of it has nearly passed from the generation that knew it. By chance, the records of it have lately been brought to light, and have fallen into my hands, and are fittingly to be deposited in our archives. But, first, it seemed to me that it would be interesting, especially at this moment, to draw from its pages an epitome of its origin and fortunes for your hearing.

It was originally named the "New-England Society for the Promotion of Natural History." The first meeting was held at the room of Dr. Jacob Bigelow, Dec. 8, 1814. Present, W. S. Shaw and Octavius Pickering, Esqs., Drs. Channing, Cushing, Perkins, Bigelow, and Hayward, and Messrs. Tucker, Dana, Webster, and Ware. Dr. Channing was chosen chairman, and Dr. Bigelow secretary, for the evening. Drs. Bigelow and Hayward, and Mr. Pickering, were chosen a committee to frame a Constitution, which was duly adopted at a meeting two evenings afterward. It provided for a President, Vice-President, a Corresponding and a Recording Secretary, Treasurer, and Cabinet-keeper, and assigned the usual duties. There were to be Immediate, Corresponding, and Honorary Members. Entire unanimity was required for election. An annual assessment of five dollars was laid; a fine of fifty cents imposed for absence; and, for three absences, a forfeiture of membership was incurred. An Executive Committee of five was to manage the rooms and collections. No specimens were to be received on deposit, and none removed without a special vote. Meetings were held weekly, on Saturday evenings. The members were divided into six classes: viz., for minerals; for plants and vegetables; for quadrupeds and birds; for fishes, reptiles, and serpents; for insects; and for vermes, corals, madrepores, &c. Hon. John Davis was chosen

President; William S. Shaw, Vice-President; Jacob Bigelow, Corresponding Secretary; George Hayward, Recording Secretary; Octavius Pickering, Treasurer; John W. Webster, Cabinet-keeper. A room was obtained in Joy's Buildings, and members were invited to bring in specimens. At the meeting on Dec. 29, a considerable collection was reported; and it was provided that those who gave specimens should accompany them with a written account of them. A common-place-book, in which to note down facts and observations relating to natural history, was also decreed. A recovery of this volume would be a most desirable curiosity.

1815. — The name of the Society not proving satisfactory, it was changed, Jan. 21, to "Linnæan Society of New England." The first paper offered was by Mr. J. Freeman Dana (Jan. 28), and was entitled "An Analysis of the Incrustation formed upon the Basket of Eggs from Derbyshire, Eng., presented by Judge Davis." Feb. 4, it was agreed that each member should prepare some animal for the collection; and, Feb. 15, "a considerable number of animals was presented, all prepared during the week." A committee appointed to report on the best methods of preserving specimens, another to have popular directions prepared and printed for masters of vessels, another to report on the expediency of becoming incorporated, Dr. Bigelow to prepare a newspaper account of the objects and wants of the Society, were among the active measures adopted for advancing its interests. March 4, a second paper was read by Mr. John Lowell, "On the Resemblance between certain Customs of the Modern Italians and Ancient Romans." A quarterly meeting was enacted, to which all classes of members should be invited; and a paper on some subject connected with the pursuits of the Society was to be read by a person appointed at a previous meeting. The first of these addresses was given by the President, Judge Davis, June 21, 1815; which is recorded as "an elegant address on the advantages of natural history and the objects of the institution."

Among the pleasant features of the Society was that of holding the annual meeting at some place out of town, where the day was spent in collecting specimens: the officers were elected, and the occasion was crowned by a convivial dinner. One of these took place at Richards', in Brookline, at which it is recorded that the Hon. John Lowell and Hon. Josiah Quincy were present; another, at Fresh Pond; another, down the harbor; and another, up the Middlesex Canal by invitation of Mr. Sullivan, dining at Woburn. Thus the Society went onward, literally rejoicing. The room soon became too small, and a larger one was procured in Boylston Hall. M. Duchesne, "an ingenious Frenchman, was engaged to prepare animals, and take care of the cabinet;" and the hall was opened to the public from four to six, P.M., on Saturdays.

Among the donations, the first one specified was a likeness of Mr. Roscoe, presented by Mr. Francis Boott. Commodore Stewart, of the frigate "Constitution," presented two living tigers. These tigers were somehow lost, as we find a record of settlement with Mr. Savage for their loss, February, 1818, the avails of which came at an opportune moment to make up for deficit in rent (some of the members of this Society may recollect sundry donations of living cougars, lions, owls, eagles, tortoises, &c., which in a similar manner came to grief); a living bear from Commodore Chauncey; Chinese insects from B. P. Tilden; corals from Dr. Swift; minerals from Vesuvius; birds from France; birds from Africa; a series of English game-birds; a caribou; and, above all, is announced "the most interesting and valuable specimen the country affords; namely, a large species of deer, commonly called the elk, of which no accurate account has been given."

There can be no doubt that the few men who composed the active members labored zealously and successfully. In the record for November, 1816, the secretary says, "The zeal of the members seems to be unabated; and, if the collection continues to increase for a few years in the same proportion, it will surpass every establishment of the kind in the United States, and almost rival those of Europe."

In June, 1817, by previous arrangement, a special meeting was held to listen to an address from Dr. Channing. The society was honored by the presence of the Governor, Lieutenant-Governor, Council, President of the University, President and members of the Senate, and many other gentlemen of distinction. There was also a considerable number of ladies. The whole company seemed surprised at the size of the collection, and highly pleased with the general appearance of order and neatness in every part of the cabinet. Dr. Channing read his address upon "the importance of literature and science, particularly to the inhabitants of New England." The claims of this Society to public patronage were stated, and urged with great force and ingenuity; and the rapid increase and value of the specimens were set forth. The interest excited at this meeting gave the Society reason to believe that the importance of their institution was fully appreciated, and that the public already felt disposed to protect and patronize it.

But, alas! here the good star of the Society appears to have culminated. The famous inquiry into the existence and nature of the sea-serpent, it is true, took place subsequently to this; but it did not add greatly to the laurels of the Society. It was the only paper ever published by the Society, as such. But, early in 1818, we find a proposition to unite with the Athenæum, or to adopt some other way for the preservation of the cabinet. The meetings, from February to July, are said not to have been holden with as much regularity as heretofore. April, 1819, it is said that the meetings were not held with any regularity: several unsuccessful attempts had been made to hire individuals to preserve the specimens: and the members had the mortification of seeing a museum going to decay, that had cost them so much labor and expense. But it seemed to be inevitable: they were most of them engaged in professional pursuits, and, of course, could not give their personal services: and the funds were not sufficient to hire it to be done. Things went on thus till March, 1820; when a meeting was held to consider the expediency of disposing of the collection. The members, however, agreed, that, if a subscription of \$100 per annum for ten years could be obtained, they would renew their efforts. This was obtained, and considerably more. An act of incorporation was obtained in June, 1820; several new members were elected; the formation of a library was voted expedient; a few donations were made, among which were the bones of a camel, and two specimens of a cast of the famous Chinese monster, A-ke, one of which was subsequently given to the Medical College. Very few, if any, communications were made. In this lingering state it continued until July, 1822; when a committee was appointed to consider what could be done, who reported, "that it appears, by the resignation and non-attendance of members, that it has become burdensome to support its meetings and collections in the manner they have hitherto done: therefore it is expedient to suspend the meetings, give up the rooms of the Society, and place the collection, or such part of it as can be preserved, in some place where it may occasion no further expense to the Society or its contributors." It was first offered to the Athenæum, but the trustees declined accepting it; then to the corporation of Harvard College, who agreed to accept the unperishable specimens, and \$264.29½, the cash balance in the treasury; to erect a building to receive them; and to grant to the members free access to the collection and to the Botanic Garden. The perishable specimens, such as stuffed skins and specimens in alcohol, were given to Mr. Greenwood, the proprietor of the New-England Museum, with the right of free admission: and were sold at auction when that establishment terminated. Many of them were bought by Mr. Kimball, and are still in his Museum.

As the College failed to comply with the condition to erect a building, a meeting of the members accessible was called, December, 1830, and the specimens, or such of them as might not have perished, were reclaimed, that they might be made useful for the purposes originally intended; and they were subsequently given to this Society. A few empty glazed cases, or containing dilapidated monkeys and birds, altogether unsuitable for our use, was all that we ever received.

Dr. Gould closed by endeavoring, from a review of the history of this Society as well as of our own, to impress upon the members the importance of preparing and arranging the collections by direct personal labor, if they would insure the success of the Society and the advance of our science.

The following is a list of the papers presented before the Society:—

1815, Jan. 21. J. Freeman Dana. Analysis of the incrustation formed on the Basket of Eggs from Derbyshire.

Feb. 11. J. Freeman Dana. Account of the Ichneumon atrator.

March 4. Hon. John Lowell. On the resemblance between certain customs of the modern Italians and ancient Romans.

June 21 (quarterly). Judge Davis. On the Advantages of Natural History, and the Objects of this Institution.

Sept. 20 (quarterly). On the History and Medical Properties of a Native Plant, Triosteum perfoliatum.

Nov. Mr. Goodwin of Sandwich. Account of Tadpoles in that Place.

1816, April. Judge Davis. Account of several Insects from China.

June. J. Freeman Dana. Observations on the Monadnock Mountain.

Aug. J. Bigelow. Some account of an Expedition to the White Mountains, undertaken by himself and a few other members of the Society.

Nov. J. F. Dana. On the Chemical Composition of Saratoga Waters.

Dec. John Ware. Dissection of two Pigs preternaturally united.

1817, Jan. George Hayward. Description of an Elk, and the appearance presented on dissection.

Feb. Judge Davis. Translation, from the Transactions of the Swedish Academy, of a paper on the Luminosity of the Ocean.

April. Samuel L. Dana. On the Geology and Mineralogy of Cambridge and the Vicinity.

June 18 (special). Walter Channing. Public Address on the Importance of Literature and Science, particularly to the inhabitants of New England, setting forth the history and claims of the Society.

Aug. George Hayward. On the medicinal properties of Phytolacca decandra.

Sept. and Oct. Reports on the Sea-serpent. Report of a Committee relative to a large marine animal, supposed to be a serpent, seen near Cape Ann in August, 1817. This was the *magnum opus* of the Society, and the only one published under its auspices in a separate form. It was in an octavo of 52 pages, and two copperplates illustrating the form and dissection of a smaller specimen, supposed to be the young.

1818, Aug. J. W. Webster. On the Mineralogy and Geology of the Island of St. Michael's.

Mr. W. Putnam Kuhn was elected a Resident Member.

December 2, 1863.

The President in the chair.

Mr. T. T. Bouvé remarked, that, before we proceeded to business, it seemed to him meet that we should express in some way our appreciation of the loss which this Society and the community generally have suffered in the death of our friend and associate, Mr. Francis Alger.

"Public-spirited," continued Mr. Bouvé, "he always felt a strong interest in all institutions designed for the welfare of the people, and often gave of his means for their endowment. Especially was he interested in the promulgation of knowledge relating to his favorite branch of science,—that of Mineralogy. To further this, he was always ready to give specimens; and often liberally invited parties interested to select from his duplicates whatever might be of service to them. Many are indebted to him for such favors.

"Sad, indeed, is it to me, Mr. President, when I look back upon my early endeavors to find sympathy in the study that interested me, and reflect that two of the only three persons I could then find to aid me in my inquiries, and to hold out to me the hand of fellowship in my pursuit (Dr. Martin Gay and Mr. Francis Alger), are numbered with the dead. The other I refer to is my friend Dr. C. T. Jackson.

"It is but a few days since that Mr. Alger suggested to me his intention to send some of his large beryls and other minerals to adorn our grounds outside the building; and such was his interest in the Society, that I cannot but think that his large collection of minerals would have come into our possession, at a not distant day, if his sudden departure had not prevented the fruition of his wishes."

Dr. A. A. Gould referred to the communications presented to the Society by Mr. Alger, which were always fully and scientifically done, yet presented with great modesty, and all suggestions received with deference.

On motion of Mr. Bouvé, Dr. Charles T. Jackson was requested to prepare suitable resolutions, and present them at a future meeting.

Prof. H. J. Clark presented a communication, in which he stated that he had recently discovered the *eggs* of Tubularia; and that it was owing to their minute size and excessive transparency that they had not been seen before. In this connection, he described the mode of formation of the meduso-genital of these Hydroids, showing that it differs from all that has been published hitherto.* He also announced his discovery of the female of *Rhizogeton fusiformis*, Ag.

The ovigerous meduso-genital is borne singly upon a stem, which is at least two-thirds as long as that of the sterile form. The young leave their parent in the planula state by breaking through the wall of the medusoid: but the latter being covered by a filmy, chitinous investment, the planules are held in it for a while, and sometimes until all of them have escaped from the parent; and then, being grouped in a close mass about the latter, they very naturally would be, at first sight, mistaken for medusoids attached to a hydroid head, in the same way as occurs in Clava. This is rendered all the more deceptive from the fact, that when the medusoid is empty it elongates, and the wall of the proboscis presses more or less closely against the wall of the bell, and the two together seem as if they were the two walls of a hydroid head. This peculiarity has led Prof. Agassiz to state in the fourth volume of his "Contributions," in regard to the male medusoid, that "*one and the same individual medusa, after discharging its reproductive organs, is metamorphosed into a hydra.*" This, Prof. Clark believed, was not true; nor was there any thing in the description or illustrations in the "Contributions" which warranted such a statement. The proper explanation is, that the medusoid withers and becomes resorbed; and then a hydroid head develops, in all probability, directly from the end of the old stem.

Mr. A. E. Verrill read the following papers: —

Description of a Species of Samia, supposed to be new, from Norway, Me. — By S. I. Smith.

Among the *Attaci* collected by me the past season, there is a pair of moths closely allied to *Samia Cecropia* Hübner, which I am unable to refer to any described species. A single specimen of the same species, obtained in 1862, was forwarded to the Museum of Comparative Zoölogy at Cambridge, and there pronounced new by Mr. A. S. Packard, jun. I have therefore, with the entire approbation of Mr. Packard,

* This is published, with full details, in the "American Journal of Science" for January, 1864.

who is himself engaged upon a monograph of this group, prepared the following description of this interesting addition to our insect fauna:—

Samia Columbia.

♂. Antennæ black, and broadly pectinated. Palpi dark maroon brown. Thorax with a white band before; upper side dark maroon, with a short gray band behind; beneath black; the legs also black, slightly tinged with brownish toward the extremities. Abdomen annulated with alternate black and dirty white.

Above. *Primaries* with a grayish white band near the base, extending from the inner nearly to the costal border, and enclosing a reddish-brown patch at the base. The middle area of the wing is dark brown, tinged with reddish toward the centre, and contains a triangular white discal spot, bordered on the side toward the base with black, and on the other sides with grayish brown. There is a narrow white transverse band, wider toward the inner border, between the middle and outer area. A sinuous black line, on a clay-colored ground, crosses the posterior border. Near the apex there is a round black spot, containing a bluish-white crescent, with its horns toward the outer border; between this and another small oblong black spot at the apex, there is a zigzag white line in the form of a W, with the upper side toward the outer border. A space along the costal border, extending from this zigzag line almost to the middle area, is bluish white, growing darker and more indistinct as it approaches the transverse band. A short band between the middle area and the grayish outer border, extending from the inner border a third of the way across the wing, is dark grayish brown, becoming lighter as it leaves the inner border. *Secondaries* with a small dirty white spot on the shoulder, and the anterior border just edged with the same. A white transverse band similar to the one on the primaries. The space between this band and the base of the wing is dark brown, with the discal spot large and white; the outer border is margined with clay-color, bounded on the inside by an arcuate black line. Just inside of this line, there is a band of oblong black spots on a grayish ground; the space between this band of spots and the transverse band is occupied by a wide grayish-brown band.

Beneath, the markings of the upper side are repeated; but all the reddish tints are wanting, so as to leave the ground-color of the wings black, intermingled with whitish scales. The discal spots are bordered with black.

♀. The antennæ are less broadly pectinated than in the male, and all the colors less intense. Discal spots of the primaries almost obsolete; being only short lines bordered with black, and parallel to the transverse band. Discal spots of the secondaries much smaller than in the male, and more rounded.

Expanse of wings, ♂ 4 in.; ♀ 4.9 in. 1♂, 1♀.

The cocoon is double; the outer coat being an oblong oval, pointed at the upper end; dark ashy-brown, with little patches of silvery silk, and with an irregular, knobby surface. It is attached longitudinally to the side of a twig. The inner cocoon is of a regular oval at both ends, and closely woven upon the outer coat, except at the upper end, where the point of the outer cocoon extends above the inner one. Among about twenty cocoons, there seems to be scarcely any variation.

Length of cocoon, 1.80 to 2.15 in.; diameter, .6 to .8 inches.

All the cocoons* were found, during the fall and winter, upon or near an extensive bog covered with low bushes. They were mostly attached to *Nemopanthes canadensis* and *Rhodora canadensis;* a few were found upon *Kalmia angustifolia* and maple, and one upon a larch. The larvæ undoubtedly feed upon the first two plants, and perhaps upon the others; but the cocoons were always where the larvæ might have fed upon the *Nemopanthes* or *Rhodora*.

The imagines appeared May 24 and 29.

This species differs materially in color from *S. Cecropia*. The male has the antennæ, palpi, thorax, and legs much darker. The short gray band on the hind part of the thorax is not found in *S. Cecropia*. The discal spots of all the wings are white instead of dull red, with a white centre. The transverse bands of both pairs of wings are white instead of dull red, bordered internally with white. It wants the broad white band so conspicuous on the anterior border of the secondaries of *S. Cecropia*, and also the reddish tints and markings near the apices of the primaries.

The female differs from the female of *S. Cecropia* in having the palpi, thorax, legs, and abdominal rings dark brown, or almost black, instead of dull red. The discal spots of the primaries are linear, obscure, and parallel to the transverse band, instead of broad, conspicuous, and parallel to the costal border. The discal spots of the secondaries are small, and almost round, instead of large and somewhat triangular. As in the male, it has the white on the hind part of the thorax, and wants the white on the anterior border of the secondaries, and also the red on the apices of the primaries, on the discal spots, and on the transverse bands.

* This species seems to be infested by an unusually large number of parasites; since, out of more than twenty cocoons, I have succeeded in raising but three, nearly all the rest having been destroyed by ichneumons and other parasites. Its remarkable rarity is, perhaps, due to this fact.

The cocoon differs greatly from that of *S. Cecropia*. It is much smaller, and of a more regular form. It is dark brown, approaching black in some places, with silvery spots, instead of uniformly light brown. The inner and outer cocoons are so closely woven together, except at the very top, as to be separated with difficulty; while in *S. Cecropia* they are separated by quite a space filled with loose silk.

It seems to differ also in habits; preferring the plants of boggy or swampy lands, instead of those of cultivated or high lands.

Two species of parasites, both of them ichneumons, were raised from the cocoons of this moth. Of the first, about fifteen appeared from one cocoon, May 21 and 22. They escaped by gnawing small round holes through the sides of the cocoon; several escaping through one hole. These expanded about four-tenths of an inch. The other species appeared from June 19 to July 10. They escaped from the upper end of the cocoons, apparently without gnawing the outer coat. They expanded about eight-tenths of an inch.

Notes on two Ichneumons parasitic on Samia Columbia. By A. S. Packard, Jun.

Most of the cocoons of this fine moth were found by Mr. Smith to be ichneumoned. The parasites were not only hatched out alive, but, upon cutting into cocoons apparently free from their attacks, the Samia pupa was found to be missing, and the cocoon crowded with those of the Cryptus parasite. They were half an inch in length, being long and slender; consisting of an outer tough parchment-like case, and an inner much more delicate one. They were about forty in number, and arranged longitudinally, with their anterior extremities directed toward the opening for the exit of the moth itself. Many of the parasites had escaped through the natural exit; others, which had hatched from cocoons situated far back, unable to force their way forwards, had mostly died while attempting to bore their way through the extremely dense cocoon of the moth.

No differences could be perceived between the cocoons, though belonging to two quite distinct species.

Cryptus samiæ (n. sp.).

♂ The head, thorax, and four terminal joints of the abdomen are black; and the whole surface of the body is finely punctate, especially on the head and thorax. Antennæ: two basal joints black; the remainder pale brown, especially so toward the tip; while, on the upper side of the basal half, they are black; palpi very pale, almost pruinose; the terminal joint much darker. Legs reddish testaceous; coxa of first and second pairs very pale, concolorous with the tarsi; fore trochanters, black; middle pair reddish testaceous, with a black dot above; hind pair almost wholly black, testaceous beneath; tip of hind femora, outer three-fourths of the tibiæ, and base of first tarsal joint, black; claws of all the legs, dark; base of the first segment of the abdomen, black; the remainder reddish testaceous, except the four terminal black joints.

Length, .40 inch; length of fore wing, .23 inch.

♀ The female differs in having the antennæ darker, and being broadly annulated with white in the middle. The labial palpi are dark throughout, with only the tips of the joints pale whitish. Fore trochanters touched with reddish beneath, while the two hinder pairs are wholly reddish testaceous. The legs are as described above, except that the fore and middle coxæ are testaceous, and not pale as in the ♂. The abdomen does not differ in coloration: the ovipositor itself is reddish black, while the sheath is black.

Length, .44 inch; including the ovipositor, .65 inch; length of fore wing, .33 inch.

The other species is one-half as large, and differs from *C. samiæ* by its wholly black antennæ and abdomen. I propose for it the name —

CRYPTUS SMITHII (n. sp.).

♂ Head, thorax, and abdomen, black; antennæ, blackish-brown throughout; palpi, pale testaceous; legs, reddish testaceous, — the hind pair, with the outer two-thirds of the tibiæ, blackish; coxæ and trochanters, reddish testaceous.

Length, .23 inch; length of fore wing, .18 inch.

The female differs from the other sex only in coloration, by the duller, darker legs; the antennæ being the same.

Length, .27 inch; including the ovipositor, .35 inch; length of fore wing, .25 inch.

This species is duller colored than *C. samiæ*, which is shining jet-black or testaceous, as the case may be. The middle meso-scutal piece is much narrower, longer, and more distinct, in *C. samiæ;* the ♂ abdomen is longer; and the ovipositor, which is longer than the abdomen in *C. samiæ*, is nearly a third shorter than the abdomen in *C. Smithii.* The meta-thorax of *C. Smithii* is much rougher than that of *C. samiæ.*

Among twenty specimens of the larger species, there was no marked variation: but one of the smaller species *(C. Smithii)*, of which there were ten ♂ and ♀ specimens, was a ♂ which is a little larger than the others; i.e., .30 inch long. However, the abdomen differed from that of *C. samiæ* in being less clavate, more acute at the tip, and flatter throughout, being more ovate.

Dr. Charles Pickering, referring to the discussion at the previous meeting relative to Amphioxus, read the following extracts from his notes taken while on the United-States Exploring Expedition under Capt. Wilkes: —

Feb. 3, 1842. Sulu Island in sight (between Mindanao and Borneo). *Amphioxus* captured; it was scarcely more than a third of an inch long; struggled when taken out of the water; rather stiff like an Ammodytes, and in solidity and motions resembling a fish; but, when replaced in water and examined with a microscope, the surface of the body, on seeming intercostal spaces, was found occupied by series of *vibratile ciliæ*, continually in motion, and not unlike the so-called "branchiæ" of Salpa.

The animal itself, being transparent, presented interior lines having the semblance of a skeleton. These lines did not appear to be nerves; for they were devoid of expansions and of ganglia. The animal had no head, eyes, nostrils, mouth, nor brain; the organ holding the place of a medulla spinalis terminating anteriorly in an obtuse point; and seemed, besides, devoid of branches. A nervous system, therefore, could not be made out. The absence of a heart was also noted, and of blood-vessels, and all signs of a circulation.

The so-called "mouth" was much as in Yarrel's figure, and appeared to lead into a large cavity occupying the thoraciform portion of the body; which cavity was continued beyond, and again enlarged into a loose sack, marked with longitudinal lines or furrows, and, at the extremity, occasionally manifesting a slight retractile movement; but whether a vent was situated here could not be determined. Above the loose sack was something like an intestine, prolonged into the tail, and containing extraneous substances; its contractile movements seeming too quick for peristaltic.

Transparency being also incongruous with the class Vertebrata, the conclusion arrived at was, that the Amphioxus is neither a vertebrate animal nor a mollusk. After a brief examination, the specimen was handed to Mr. Dana; whose figure will probably supply further particulars.

In consequence of the discovery of an Amphioxus on our own coast, the above observations are offered for comparison, in order that, if possible, the real affinities of the animal may be ascertained.

Prof. J. Wyman observed that the researches of Quartrefages and Peters, on the European species of this genus, had proved, beyond question, that this animal is a true vertebrate.

Mr. Thomas Gaffield made some remarks on the action of sunlight on window-glass.

He believed that his experiments in connection with the subject were original as to their method and their extent, although it had long been observed in Europe that colorless or light-colored plate-glass had turned to a purple hue by exposure to intense sunlight. One case * is cited of a change to a gold color; and one experiment recorded by Dr. Faraday, † some forty years ago, proving that a light purple changed to a darker hue after eight months' exposure.

Other experiments are on record showing the action of glass of different colors as media in the transmission of light and of heat; but none, with the above exception, showing the effect produced on the glass itself.

An experience of some twenty years in the window-glass business had only presented a few isolated cases of supposed change of color from this cause, which were attributed to some obvious defect in an article of inferior manufacture; but, within a short time, he had heard of the change of color in an article of superior manufacture, in a quantity of white plate-glass, of which some lights had been broken out of a window in which they had been exposed to the sun.

This fact coming to his knowledge led him to try an experiment with several specimens of plate, crown, and sheet glass, during the month of July last; which proved that a month's exposure to a hot sun would change the best white French plate and all white sheet glass, such as is used for photographs and engravings, to a color containing more or less of a yellow hue. The dark green and dark blue or bluish green did not experience any change; but any hue which approached a white, whether bluish, greenish, or yellowish white, turned to a yellowish color.

A second series of experiments, commenced in July, and continued three months, on some thirty specimens from France, England, Belgium, Germany, and the United States, only confirmed the results of the first; and a daily examination at first, and afterward from week to week, and month to month, revealed the interesting fact, that, even after a single day's exposure to a July sun, the change of color will, in some instances of the lightest hues, commence.

So remarkable was the change in a week, affecting nearly all the light-colored glasses, that Mr. Gaffield commenced a third experiment on the 6th of August which should speak for itself. He then exhibited to the Society ten pieces of French white plate-glass, four by two inches in size (all of which were cut from the same sheet), one of which showed the original colorless glass, and the others exhibiting the change of hue towards yellow, after exposure respectively of one, two, and four days; one, two, and three weeks; one, two, and three months.

* Journal of Society of Arts for Feb. 15, 1854.

† Dr. Faraday's Chemical Researches. London, 1859, p. 142.

The changes in the first four days were slight; but the last specimens were so yellow as to exhibit a contrast very marked, and excited the interest of all the members present. That the color permeates the body of the glass, and is not confined to the surface, or produced by reflection therefrom, has been conclusively proved by grinding off about one-sixteenth of an inch from both surfaces and the four edges of a duplicate exposed specimen, which, after repolishing, still exhibited the same yellow color.

The glasses exposed were all what are called colorless window-glasses, although they varied in tinge and hue from the whitest French plate to the darkest green English sheet-glass.

An experiment for four months, from July to November, on really *colored* glasses, red, green, yellow, blue, and purple, showed no change except in the purple, which became slightly darker.

The experiments were carried on upon a rough plate-glass roof, nearly horizontal, and which received the rays of the sun during the greater part of the day. In all cases, strips corresponding to those exposed, and cut off from the same pieces, were placed in the dark, to be compared with the other specimens after exposure.

It will be noticed that the dark green, blue, and bluish green did not change. The color of the Belgian sheet (called German or French by glass-dealers in America), a yellowish or brownish green, did not change; and these were the only exceptions. All plate-glasses changed, except an inferior blue quality, and a superior crystal plate of a greenish color, made in Germany, and at the only factory which has not given up the use of pot-ash for soda-ash.

It is possible that a longer exposure of a year, or of years, might change every color in some degree.

His inquiries, since he instituted these experiments, have brought out some fine specimens of Belgian sheet-glass from a house built three years ago, which had changed in some instances to a golden, and in others to the well-known purple hue.

It is Mr. Gaffield's intention to pursue the experiments farther, with a view to ascertain the effects of sunlight during each month and season of the year; and also whether exposure to heat, air, or moisture alone, out of the direct action of the sun's rays, will produce any corresponding change.

Mr. Gaffield does not propound any theory to explain these changes of color, which, under our sunny skies, probably take place much more rapidly than in the different and less clear atmosphere of England.

Some writers point to the presence of oxide of manganese in the original composition of window-glass, and some to the oxyde of iron, as a chief cause.

Some writers have peculiar theories about the different classes of the sun's rays. Some may think the change referred to a molecular or chemical one; and others, wiser than the rest, refrain from any explanation, waiting for a larger multiplication of experiments, and a greater accumulation of facts, before educing any satisfactory law of Nature which governs these curious and interesting phenomena.

Mr. Gaffield makes no pretensions to any discoveries, unless it be to the very rapid change in glass observed in our climate in July, but only gives the result of his experiments, in the hope that the great interest now manifested in the subjects of light and heat may lead others to examine the matter, to repeat the same experiments in other countries, and to give the world the result of their researches, and enable the learned and scientific men of the age to explain this remarkable power and action of the sun's rays.

It should be remembered that Mr. Gaffield submitted his specimens to the most severe tests by placing them where they received reflected as well as transmitted light and heat. The change in glass, when glazed in the windows of our dwellings and stores, is so much more gradual, that it very rarely attracts the attention of observers, except in a marked variation from white to purple.

Mr. F. W. Putnam said, that, at the last meeting of the Essex Institute in Salem, Mr. Ordway of Ipswich gave a communication upon the habits of the canker-worm (*Anisopteryx vernata* Harris), in connection with a patented article to prevent the insect from laying its eggs upon trees.

Mr. Ordway had spent several years in watching the habits of the canker-worm, and had tried many ways to prevent the ravages of the insect, but had not been successful until the present season, when he met with success by fastening a rim of zinc to the tree by a piece of cloth tied round the tree above, and arranged in such a manner, that the female moth, in crawling up the tree, came in contact with the cloth, and was forced to crawl down over it, and thus be brought in contact with the rim of zinc. Upon the under side of the zinc-rim a narrow band of zinc was soldered, so as to make an acute angle. When the female moth came to the rim of zinc, she would endeavor to pass over it, and, to do so, would have to come in contact with the band soldered to the rim; and, in attempting to pass over this, she would invariably fall to the ground. It was ascertained that the particular angle made by the soldering of the band to the rim could not be got over by the moth, though all other angles could be easily spanned. The reason why the moth cannot pass this particular angle seems to be, that, in passing from one piece of zinc to the other, she has to move sideways, and thus support herself on three legs, on the rim, while she endeavors to get the other three on the band; and, as her weight is too great to be thus supported, she falls from the zinc in the attempt. Mr. Ordway thought, that, if she only had another pair or even longer legs, she could get over easily enough. It would be interesting for the supporters of the development theory to try to develop the legs of this insect to the required length or number necessary for the purpose. It was ascertained that the weight of the females was the principal reason of their not being able to pass over the angle; as, after they have laid their eggs, they can pass readily enough. Mr. Putnam saw hundreds of the insects try to get over the angle; but every one failed in the attempt. After dropping once or twice, they are so much injured that they do not have the strength to try again, and soon die where they fall; or, as as a last effort, deposit their eggs on the trunk of the tree, below the protector. Mr. Putnam saw several drop just as soon as the antennæ were brought in contact with the second piece of zinc, thus showing the extreme sensitiveness of these organs. It will be interesting to know the exact angle that is required to prevent the insects from crawling over; and he had requested Mr. Ordway to measure it. Mr. Ordway thought, that the canker-worms did not leave the earth until after a frost, and that the average life of the female insect was about eight days. The male insect he had found crawling up the trees before its wings were expanded. Mr. Ordway had never found the pupæ in the earth below six inches, or above two. The female canker-worm will never attempt to crawl under an obstacle when she can crawl over it; but, if she is prevented from crawling over, she will squeeze herself through a very small space, if it is large enough to get her head through, though the body is much larger than the head.

The following letters, which had been recently received, were read; viz.: —

From the Royal Society, London, Aug. 13, 1863, acknowledging the receipt of the Society's publications; the Société Géologique de France, May 25, 1863, communicating certain changes in its rules with regard to papers laid before that society; and from C. H. Hitchcock, Quebec, Oct. 29, acknowledging his election as a Corresponding Member.

Mr. A. S. Packard, jun., was elected Curator of Crustacea.

Prof. William Haidinger, of Vienna, was elected an Honorary Member.

Mr. Charles A. Stearns was elected a Resident Member.

December 16, 1863.

The President in the chair.

Dr. J. Wyman offered the following observations on the skeleton of a Hottentot, some account of whom was given at a former meeting (see Proceedings, April 2, 1862): —

The subject was nearly adult, the wisdom-teeth being fully mature. All the long bones of the skeleton, however, showed incomplete ossification, the epiphyses in many instances still remaining unattached. Such was especially the case in the upper end of the humerus, tibia, and fibula, and the lower ends of the ulna, radius, and femur; or, in other words, in the ends of the bones to which the nutritious artery is not directed.

The individual was unusually tall for a Hottentot, and measured five feet and five inches in height. A comparison of Hottentot and Bushman skeletons, and casts of bodies, contained in the museums of London and Paris, give an average height of four feet and six inches. While the height of the body just equalled the distance between the tips of the fingers, the arms being outspread, the legs were disproportionately long, so that the pubes was more than five inches above the centre of the whole height.

In the external configuration of the cranium proper, there was nothing remarkable, except that the top was somewhat flattened, the forehead narrow, sloping outwards and backwards from a somewhat prominent ridge, corresponding with the obliterated frontal suture.

When held at arm's-length, and viewed from above, the zygomatic arches are just in sight; but the fossæ are nearly concealed. The measurements show that the cranium is not brachycephalic, as in the Mongolians, but decidedly elongated, as in the Negroes.

The most striking features to be seen in the head are those found in the bones of the face, especially in the nasals, maxillaries, and malars.

The nasals are completely co-ossified with each other, no trace of a suture remaining. This was the more noticeable, as the individual was young, and the bones of the skeleton generally are immature; and has an interest in connection with the fact that the nasal bones are co-ossified at an early period in the monkeys, and before the completion of the first dentition in the Gorillas and Chimpanzees. These bones in the Hottentot are remarkable for their great breadth, especially at the upper part, which is the broadest portion of them. They do not recede from the outline of the frontal bone, which is continued, without interruption, to the middle of the nose, where the bones project very slightly forwards. In a transverse direction, they are nearly flat, with only a scarcely discernible ridge at their line of union: they are consequently nearly in the same plane with the anterior edge of the upper ends of the maxillaries. The naso-frontal suture is horizontal for the distance of half an inch, is bent down at either end to become continuous with the fronto-maxillary suture, and is remarkable for its great length. The breadth of the root of the nose is dependent on the nasals, and not upon the breadth of the ascending part of the superior maxillary bones, as stated by Dr. Knox.*

Malar bones. These, with the outer portion of the maxillaries, are remarkably bulging and rounded. The portions of the edges of the orbits formed by them, instead of being somewhat sharp, as in other crania, are quite noticeable for their roundness. The zygomatic arches do not differ from those of ordinary crania in their projection outwards.

Maxillary bones. The edges of the ascending portions of the *upper jaw*, where they form the border of the nares, project very little beyond the level of the face, and are bent inwards, instead of being directed forwards. It is in consequence of this, and the flatness of the nasal bones, that the middle portion of the face is so slightly prominent. The alveolar borders are remarkably prominent, forming a somewhat pointed arch; the space occupied by the incisor teeth being narrow, and the lateral incisors facing more outwards than forwards. No trace of an intermaxillary suture could be detected.

The outline of the alveolar portion of the *lower jaw* corresponds with that of the upper; the symphysis is remarkably high, and the chin strikingly pointed and prominent. The height of the bone diminishes rapidly backwards, and the angles are not prominent. This description agrees with that of Cuvier, as regards the prominence of the jaws; and differs from that of Blumenbach, who asserts that the jaws do not project at all.

The orbits are quadrangular; the tranverse diameter considerably the longest.

Interior of the cranium. The most striking feature here is the narrowness and the diminutive size of the fossæ for the lodgement of the anterior cerebral lobes. The orbitar plates of the frontal bones rise higher above the cribriform plate of the ethmoid bone, and make the olfactory fossa deeper, than in ordinary crania: they ascend rapidly on each side, thus projecting into the cavity of the head at the expense of the space usually occupied by the anterior lobes of the brain.

The foramen magnum was rather under than over the average size;

* Quoted by Prichard. Researches into the Phys. Hist. of Man, vol. i. p. 313. London: 1851.

and, in this respect, differs from Cuvier's description of the same part in the Hottentot Venus, in which he says that it is proportionally larger than in other heads; and, "according to the views of Sömmering, would indicate an inferior nature."

The capacity of the cranium was measured by Dr. J. C. White, the Curator of Comparative Anatomy, and found to be eighty-two cubic inches.

MEASUREMENTS OF THE CRANIUM.

Circumference of cranium	20.75
From one auditory meatus to the other over vertex	12.50
Longest diameter of cranium outside	7.45
Greatest transverse diameter outside	5.60
From anterior edge of foramen magnum to alveoli	3.85
From anterior edge of foramen magnum to occiput	3.65
Length of cranium and face from alveoli to occiput	7.50
Breadth across malar bones	4.35
Breadth across zygomatic arches	5.30
Transverse diameter of orbit	1.68
Vertical diameter of orbit	1.32
Inter orbitar space	1.00
Length of nasal bones	.97
Transverse diameter, above	.63
Transverse diameter, middle	.41
Transverse diameter, lower portion	.53
Height of the symphysis of the lower jaw, exclusive of teeth	1.64
Breadth of lower jaw, through angles	3.55
Longitudinal diameter of cranium, inside	6.90
Transverse diameter of cranium, inside	5.18
Height of cranium, inside	4.62
Greatest breadth of anterior cerebral fossa	4.00
Greatest breadth of cerebellar fossa	4.37
Length of foramen magnum	1.48
Breadth of foramen magnum	1.16

Pelvis. — This is very remarkable for its diminutive size, and, when seen in front, for its square form. From the table of measurements, it will be seen that the breadth of it is but little in excess over the height. While, in ordinary skeletons of Europeans, the former dimension exceeds the latter by between two and three inches, in this Hottentot it is only by 0.33 of an inch. The height of the crests of the ilia above the base of the sacrum is also greater than in the common pelvis: for although the pelvis of the Hottentot is so small, yet the cristæ are 1.45 of an inch above the sacrum; while, in two average pelves of white men, it was only from 1.20 to 1.25 of an inch.

The *sacrum* is very straight, and projects more backwards than usual; and the base of it is very narrow. In Caucasians, the sacrum without the coccyx forms nearly an equilateral triangle, the vertical diameter being slightly the largest. In the Hottentot, the vertical diameter is four inches; while the transverse is only 3.27 of an inch.

The anterior spinous processes of the *ilia* project almost directly forward, even in a much more marked degree than is common in the Caucasian pelvis; the iliac bones seem compressed from side to side: all of which gives to these parts a nearly vertical wall. The diameters of the brim do not differ materially in their relative size from the same in European skeletons; it being understood that these are liable to considerable variations. In the texture of the bones, the pelvis presents neither that massiveness nor the roughness which has been said to characterize this part in the Hottentots.

The resemblances of this Hottentot pelvis to that of the apes are trifling in comparison with the differences; these last being so great, that no one would hesitate in the slightest degree as to whether the pelvis in question belonged to the human family or not. The resemblances which really exist, with the exception of those belonging to the sacrum, are only shown by a close comparison of measurements.

The pelvis of the most anthropoid animals — viz., of the chimpanzee and gorilla — is characterized in a most marked degree, as differing from that of man by its relatively as well as absolutely greater length; by having the crests of the ilia in planes more nearly transverse; by having the brim of the pelvis in the form of an elongated oval, with the diameter from before backwards much the longest; by having the plane of the brim of the pelvis so inclined towards the vertebral column as to make with this last a much more open angle; in having the ischia longer, as shown by the space which separates the cotyloid cavity from the tuberosity, — the tuberosities longer, their extreme points more widely separated; in the extension of the rough surface of the tuberosity for the attachment of the muscles, as far as the symphysis; and in the greater extent of the union of the bones of the pubes with each other at the symphysis.

The sacrum of the anthropoids is also quite marked, in having its length greater in proportion to the breadth of its base.

The most striking approximation of the Hottentot pelvis to that of the anthropoids is to be found in the sacrum; for while in the Caucasian the longitudinal diameter of the base exceeds the transverse by only 0.10 of an inch, as in E^2, and is even less by 0.10, as in E^1, of the following table, in the Hottentot it is longest by 0.73, in the gorilla by 0.84, and in the chimpanzee by 0.85, of an inch. If we take into consideration the straightness of it, it will be seen, that, in the respects mentioned, it comes nearer to that of the anthropoids than of the Caucasians; but in its size, in proportion to the whole pelvis, it differs very much from the apes, and much more closely resembles the same part in man.

MEASUREMENTS OF THE PELVIS

IN TWO EUROPEANS, A HOTTENTOT, A CHIMPANZEE, AND A GORILLA.

	E1	E2	H.	C.	G.
Height of pelvis..................	8.50	7.50	7.17	11.00	15 10
Breadth across ilia................	11.50	10.00	7.50	9.86	17.70
Breadth across middle of posterior edge of the acetabulum.........	7.40	6.90	6.50	5.62	8.70
Breadth of ilia through superior spinous processes...............	6.13	6.00	5.16	4.58	9.53
From spine of pubes to tuberosities of ischia.........................	4.80	4.50	4.00	4.68	6.65
Antero-posterior diameter of brim.	3.80	4.20	3.35	6.10	8.00
Transverse diameter of brim......	5.00	4.45	3.85	4.00	6.10
Length of sacrum without coccyx.	4.30	4.20	4.00	3.75	5.54
Breadth of sacrum...............	4.40	4.10	3.27	2.90	3.70
Height of crest of ilia above the base of the sacrum.............	1.25	1.20	1.45	2.20	3.20

Limbs. — The bones of the upper limbs present, in a somewhat marked degree, a difference in the length of corresponding bones on the right and left sides, as will be seen by the accompanying table of measurements. The difference between the lengths of the ulna and humerus, though somewhat less than in the average, is, nevertheless, not uncommon in European skeletons. The humerus is perforated at its lower end, on one side by a very small opening, and on the other has only a thin plate between the olecranon and coronoid fossæ. Of seven skeletons of pure negroes which we have examined, the humerus was perforated on *both* sides in three, on *one* side in one, and on *neither* side in three.

The thigh-bones offered nothing unusual, either as to the shaft or neck. The tibiæ are remarkable for their length in proportion to that of the femora. When the two bones are placed side by side, the lower ends of both on the same level, the tibia reaches as high as the middle of the neck of the femur; while in the skeleton of a European it only reaches as far as the lesser trochanter. The upper end of the tibia is quite small, and its protuberance scarcely rises above the surface: the shaft forms an equilateral triangle; and, instead of having the anterior edge quite sharp and prominent as in Europeans, it is rounded.

The os calcis is more slender than in ordinary skeletons, and is particularly remarkable for having the tuberosity and neck only slightly exceeding the rest of the bone in their vertical diameter.

MEASUREMENTS OF BONES OF LIMBS.

	E.	H.	G.	Ch.
Length of right humerus..................	13.10	12.45	19.00	11.70
Length of left humerus.....................	12.90	12.00	"	"
Length of right ulna........................	10.40	10.30	15.20	10.60
Length of left ulna..........................	10.30	10.00	"	"

	E.	H.	G.	Ch.
Length of right clavicle....................	5.40	5.00		
Length of left clavicle.............	5.57	5.35		
Length of femur..........................	18.00	17.20	15.70	11.65
Length of tibia............................	15.00	15.00	13.00	9.55
Length of astragalus......................	3.17	3.05	4.05	
Height of tuberosity of os calcis...........	2.00	1.62	1.85	
Height of neck.............................	1.75	1.38	1.15	
Height at posterior edge of upper articular ridge..................................	2.18	1.50	1.50	

Mr. C. J. Sprague inquired whether this individual might not be considered as a somewhat gigantic representative of his race, and whether variations in height were as common among savage as among civilized races.

Dr. Wyman replied that the range of variation in height, as far as known, was much the greatest in the latter. O'Brien, the Irish giant, whose skeleton is preserved in the Hunterian Museum in London, was eight feet and four inches in height; while Borvlasky, the Polish dwarf, was less than three feet. No such difference as this is known among the savage races. Wild and domesticated animals of the same species offer similar differences.

Prof. Daniel Wilson remarked that the cranium of this Hottentot appeared to be very fairly developed; and, in speaking of the great disparity between the lower races of men and the anthropoid apes, noticed that the distinctions in the cranium of the higher and lower races of men partook much more of facial than of cerebral character.

Mr. S. H. Scudder exhibited several specimens of ancient pottery obtained by his brother, the late Rev. D. C. Scudder, from megalithic cysts in Periakulam, Madura District, South India. He also read extracts from letters written by the Rev. Messrs. Scudder and Capron, giving some account of explorations in search of these ancient remains, both on the Pulney Hills and upon the plains below, with the details of opening some of them. The specimens of pottery exhibited were much superior to those now in use among the natives of that part of India, both in elegance of form, durability of material, and superiority of workmanship. The letters, from which the following extracts were taken, were written to friends at home, which will account for the familiarity of style with which they are written.

FROM THE REV. D. C. SCUDDER.

PULNEY HILLS, May 22, 1862.

Yesterday I had what might fairly be termed a tramp, and with rather an unusual object in view. You know I have always been interested in the antiquities of India, and especially in matters pertaining to the hill tribes. I had read often of the relics found on the Nilagiris, but did not know until recently that similar remains were to be found on these Pulney Hills. A few weeks ago, I heard from Mr. Taylor that such remains were upon the hills, and accessible: so I at once proposed an excursion in search. Yesterday we started off,—Mr. Taylor, Mr. Burnell, Mr. Hunt, and I. A coolie went with us, carrying provisions for the day; and my gardener carried a crowbar and hoe. We had a cup of tea early, and were off by half-past six. After a toilsome ride, we arrived at half-past nine at the ruins of an old house occupied by a former collector of this district. It is called Blackburn's bungalow. We left our horses here in charge of our coolie, and then set out for the supposed site of the cromlechs.

We had travelled so far, a little over an hour, when Mr. Taylor, who always keeps his eyes open, shouted, "There they are!—cromlechs!" and away we rushed pell-mell at what he pointed out. Sure enough, here was the veritable thing, not to be mistaken a moment. It was upon the nose of a ridge running out from the mountain, and overlooking a long and beautiful valley below it,—a most picturesque spot. The first that we came upon were placed within a raised place twenty-four feet square, facing east and west. In or on this platform were a dozen or more of these structures. They were much broken up, and falling to decay. As originally built, they consisted of slabs of unhewn stone, three placed on end, and another immense one laid across them, giving an opening at one end. One large one measured eight feet in length, and four in breadth. We crawled under this, though the slab was partly fallen down; and, calling for the hoe, I scratched away the soil that was below, in hopes of finding flooring. I think I was not mistaken; for I found a flat stone wherever I dug, and it sounded hollow. I did not scratch away all the mould, as it was not easy work; and it was a sheer impossibility to attempt to move the slab, in hope of finding any thing beneath. There were six of these cromlechs in a row, and we made out three rows pretty clearly.

The platform itself was neatly walled up with square, unhewn stones, and raised about three feet above the ground. A couple of rods down the hill were several others of the same style, but not enclosed with any wall, or, at least, with none well preserved. We pried open one that seemed closed, but found only a heap of cobble-stones.

We needed a force of men to make proper investigation, and had to leave such further and more thorough search for another time. Leaving Mr. Burnell here, Mr. Taylor and I walked on for about half a mile, in hope of finding others on the side of a knoll. But none were visible; and, after a rest, we returned.

FROM THE REV. D. C. SCUDDER.

PULNEY HILLS, May 31, 1862.

Yesterday I had a tramp indeed. A little after six, I was off on pony with the horse-keeper and a coolie, who carried my lunch and a hoe. By nine o'clock, I reached a river not far from the first-seen cromlechs. There, seated on a flat rock, the water foaming all about me, I ate my cold eggs and biscuit, and then went on to the old spot. I set the boy at work digging in one to see if he could find a slab below corresponding to the slab above. He soon came to one, though it was well covered with rocks and loam. At the end of this cromlech was another apartment of about like size, full of cobble-stones. To get at this end of the slab, I must remove part of the pile. It was hard work in the hot sun; but we finally succeeded in uncovering both ends. The slab was very heavy, a foot thick, three feet wide, and five feet long. It was impossible to lift it. All I could do was to feel underneath. There was clearly a hollow; but whether any thing was in it I could not tell, though I pulled out a handful of damp leaves. After digging a while, I pushed farther on in search of new cromlechs. After riding two miles along a mountain-slope, I came to another spur of the mountain, jutting out into the valley. . . . Of a sudden, looking about me, I espied what I most wanted to see, — cromlechs. They were on the brow of the hill, in exactly similar position to that of the old ones. But they were much finer, in a better state of preservation, and larger. One slab was enormous. It was full eight feet high, six feet long, and a foot and a half thick, standing perfectly perpendicular on edge. This had nothing to correspond with it; but abreast of it, and in perfect line, were two well-shaped apartments, measuring each about six feet in length and three in width, about four or five feet high, three-sided, with no slab on top. Then on what would answer as the opposite side of the street was another row, but in a very tumbled-down condition; and at one end of the street was another smaller one, facing in the opposite direction. They all face either east or north.

It was very evident where the slabs came from; for the brow of the hill was a bare, stratified gneiss rock, easily peeling off into thick slabs, and the places from which they were taken were plainly marked. Some of these cromlechs also were wholly shut up; and I should like to look beneath. I dug again here in search of a lower slab; and, after digging over a foot, came to one. So all, thus far examined, have slabs below. Now, the question is, Have these cromlechs relics of any kind beneath? The slabs are so heavy, that it would require a strong force of natives to lift them; and I want to get up an expedition that shall do up the thing thoroughly.

FROM THE REV. W. B. CAPRON.

TIRUPUVANAM, Sept. 20, 1862.

Mr. Washburn, Mr. Scudder, and I have just been on an antiquarian search, from which we returned this morning. The trip was originated in the discovery of buried remains in digging for the foundations of our house in Mânâ Madura. But, as these remains were so far underground in Mânâ Madura that we could dig only upon a great uncertainty, I took these brethren to a place eight miles east of Mânâ Madura, and across the river (i.e., north) from the village of Sûdûr, where the gradual washing-away of the earth had discovered the tops of the buried jars.

There are two kinds,— one with a very wide mouth (fig. 1), and one with a narrower mouth. The latter is certainly the more tasteful shape; and we found that the jars of this shape were used for the more honorable burials. The narrow-mouthed, egg-shaped jars had not only within them various little vessels (figs. 2–10) appropriated to the service of the dead, but there was also a profusion of similar vessels buried on the outside of the jar; which latter, in the case of the wide-mouthed, bulky jars, were wanting. This distinction was apparent to us; but it might not be found to hold, on a more extended examination. It led us, however, to fancy that the better-shaped jars were for the men, and the coarser kind for the women.

I have attempted to give you a representation of these two kinds of burial-jars, and of the small vessels which we found in and around them. All the jars were, without doubt, originally covered in something like the mode represented; though we found nothing above the dotted line (see fig. 1) which may represent to you the present surface of the ground. All the jars were, of course, full of earth. Even before the cover was broken, the water from the well-saturated ground found its way up between the cover and the rim of the jar, and deposited within its thin layers of mud. In the upper part of the jars, we found coarse gravel, which came in after the cover was broken; but in the lower part only fine earth.

These burial jars are supposed to be the work, not of the ancestors of the present Hindoos, but of a race of men who were finally overcome and expelled by the Brahmans four or five hundred years ago. They are still found in some numbers in different parts of India; and are a wealthy sect, for a small one: but their power is gone as a priesthood;

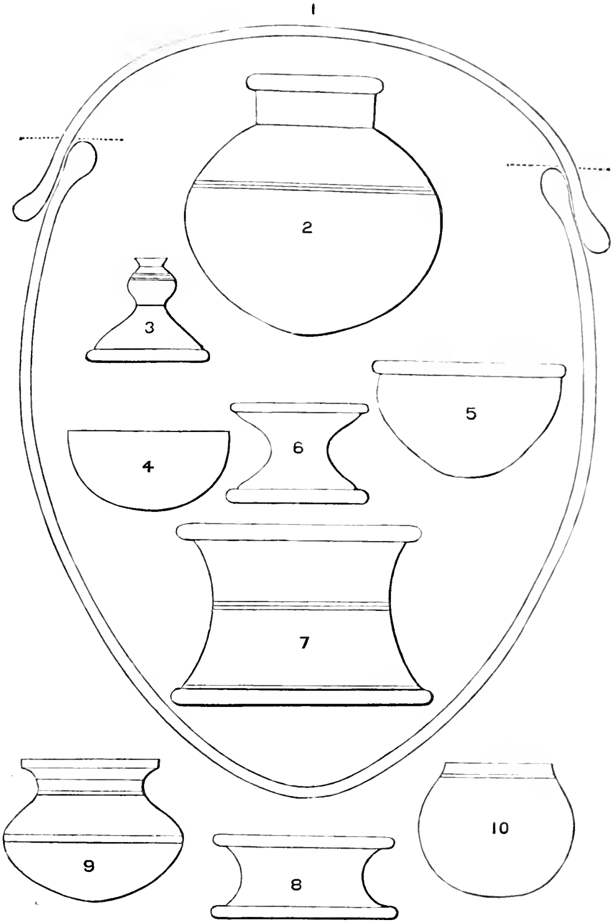


Fig. 1. Section of a jar, one-tenth natural size, drawn from a rough sketch of Mr. Capron's. **Figs. 2–10.** Drawn from the pottery, one-fifth natural size.

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and, in this part of the country, I am not aware that they are found at all. They are the Jains of whom you will find some account in modern cyclopædias.

The traditions in regard to this peculiar race show that a long period has passed away since they flourished here. We were told, again and again, that the large earthen vessels which we found were used for the purpose of burying people alive. My watchman in Mânâ Madura said there was a caste of people that didn't die, but, when they grew old, they were placed in a sitting posture within those earthen vessels (and he dropped himself suddenly to the ground, and drew his knees up to his chin, in order to show me the mode of operation); and that a little rice was given them in a chatty, and a little water in a cup, and they were left thus buried alive.

The burial jars which we found, being buried upon a gentle slope of ground, had been uncovered, as I have said, by the washing of the rain through so long a period. Originally, I suppose that they were buried to the depth of at least a foot or two below the surface; and, indeed, we were told that they were more abundant farther back upon the summit of ground where the earth had not been so much washed away, but that there we could only discover them by digging.

The large earthen pots which form the jars vary in size; the smallest of those which we examined being about two feet in height, and the largest probably four or four and a half feet: for we did not dig this up entirely. These largest are about an inch in thickness.

It would seem that these jars were receptacles for the bones and other remains of bodies after burial. We did not see any ashes, or pieces of charcoal; but we found many pieces of bones, and still more traces of bones already disintegrated, and reduced to dust. The important bones of the body may have been honored by being carefully placed in the little vessels, from one to four of which we found in the bottom of each jar. One shallow dish which we found contained about one-third of the skull of a child, which was in sufficient preservation for us to bring it away, though without taking it from the dish. Another portion of a skull was found in a similar position; but it was too far gone to be saved. It would appear that the important bones, so far as convenient, or perhaps simply the bones of the head, were placed in these small vessels in the bottom of the jar; and then the other relics were thrown into the jar in a more careless manner, and the whole covered up.

In the section of a jar, I have represented the small vessels as canted over more or less. How was this? Probably the water which trickled into the jars, and ran down the inside, rose high enough to float these little vessels; which, in that case, would never return to their original position. Sometimes they were found quite tipped over upon one side, and the lower half only filled with earth.

I mentioned a probable use of the small vessels placed within the burial-jars; viz., to contain pieces of the skull and other important bones.

We, however, actually found pieces of skull only in the more shallow vessels. It may be that the other vessels placed inside of the jar, and all that were ranged outside, were buried with the same idea that the Indians of our own country had in burying various utensils; viz., that they might serve the deceased in the spirit-world.

My drawings of these small vessels are sufficiently distinct to give you an idea of the form and comparative size, which was all I sought. You may not, however, at once see the use of one or two of them. One (figs. 6, 7, 8) puzzled us for a time; but we found it to be a stand or support for the cups, &c., which have round bottoms. Another (fig. 3) I do not understand; we got only a broken one: and I am inclined to think that I have drawn it wrong side up: that, instead of resembling a wine-cup, it should be inverted, so as to appear to be the base of a larger vessel, of which the top has been broken off.

Our munshi says that the story is current all over the country, that those people were buried alive. He says, that, for a long time, Yeman, or the God of Death, did not make his appearance; and that, when people became so old and wasted away that they were of no further use to their friends, they were buried alive in these jars. He said they were found in his own village, and in many places in the country; but he had never heard before of the existence of such smaller vessels as I showed him.

FROM THE REV. D. C. SCUDDER.

TIRUPUVANAM, Sept. 20, 1862.

We have come back from our tour of scientific research in the vicinity of Mânâ Madura. We reached the village near which the relics are at dusk, and passed the night. . . . Before five in the morning, we set out for the remains, about half a mile off. All that is seen above the surface is the rim of an earthen pot, about a foot and a half or two feet in diameter. There were some dozen or more to be seen. So we set to work to dig one up. It was about two feet deep, without a cover, and filled tight with gravel. We dug out the gravel, and at the bottom found two little pots, of such pottery as all vessels are made of in this country. Their shape, however, differs from the one common now; and in one we found about half a skull, much worn, and its form preserved only by being embedded in earth. Several teeth, and remains of other bones, were also discovered. We had two or three coolies to work for us, and opened four more. On the outside of one we found a lot of vessels, broken and whole, of various forms; one kind a very graceful cup, not unlike a finger-bowl. In each jar were found several vessels, and always remains of bones; though almost all were undistinguishable for rottenness. The object of the jars, however, was clear: the place was a burial-ground, and a very ancient one too. No one now can tell any thing of the origin of the jars. The people say that formerly there was a caste that did not die; and that such people were placed alive in these jars, with a little rice and water in the cups. Thirty years ago, there was a forest over this spot, of large trees.

FROM THE REV. D. C. SCUDDER.

PERIAKULAM, Nov. 3, 1862.

I have been quite excited to-day. You know that I have been a good deal interested in old stones and mud, and have been making explorations in different quarters. Mr. Webb is to excavate in Dindigal, and Mr. Washburn writes that old cairns have turned up somewhere in his station. But I have them nearer home, and shall not have to go to Dindigal or Mânâ Madura to pursue antiquarian researches. The other day I found an old mud fort, and near it a lot of circles of rough stones, corresponding precisely to those found in Dindigal. I inquired about them, and found the people had all sorts of notions as to what they were. I inquired of Pastor Seymour, and he knew of others, and told me what the people thought of them. We are eighty miles from Mânâ Madura; yet the same stories are current here that we heard there, — that formerly the people lived to a great age, and had to be buried alive in these big pots. They were giants too. Well, I sent Seymour to explore, this morning, in a place where there were said to be some of these pots. He came back about two o'clock, bringing me a piece of iron looking much like a cleaver, only very much rust-eaten. He said he had found pots as tall as his head, and that one of our church-members had ploughed up this year a piece of iron like a sword, and had seen many of these big pots; but they were broken now. He said, too, that circles of stones, similar to those found near here, were there; that there were cromlechs like those on the hills; and that, in a small stone house, the man had found a pottery horse of very neat pattern, much above the style common now. The whole story has quite woke me up: so to-morrow morning, early, I propose to go to the spot, close to the foot of the hills, on the road to the tope, and see for myself. They say that they find the skull in a basin, and the bones arranged around it. The iron instrument which was brought me is the first thing of the kind found, and I hope may add something to what we know of such matters.

Nov. 7.

I have spent the day in a cromlech! So you must have some account of it. Some days ago, I was attracted by the sight of some circles of stone along the side of a road which we frequently travel on. I suspected there was something within, and had our gardener dig in the centre. He soon struck upon a slab. I left it a day or two, but yesterday had him try it again. We had other help, and soon found that it was hollow below. But we could only pry off a small piece of a slab large enough to let me in. I got in, and found myself in a regular cromlech, about six feet long and three wide, but quite choked up with dirt. We could not lift up the larger piece, and had to leave, and come again at night with two big levers and ropes. This was last night, while I had my catechists here, and they helped me. We dug some, and found in one corner a potter's vessel, and on the side four. It was almost dark: so we covered the vessel with dirt, and came home. The meeting closed yesterday. So, to-day, I set out with the determination of giving up one day to antiquities. I went out about six with a gardener, and we went to work. The first thing we came to of interest was a doorway in one end: that is, a round hole, with a stone set up against it outside. I hurrahed internally; for this was a discovery. It corresponds precisely with cromlechs found upon the Nilagiris, and which I have never seen here. It is supposed, and I think with good reason, that these are tombs, and that the hole was made for a person to enter and deposit the bodies for sepulture. In proof of this are the contents of the tomb. One thing after another turned up; but I will simply state what, not detailing the individual things. We found a pot on four legs, a remarkable affair. The chief things were two big pots, such as I described before as containing smaller vessels, lying on their sides, facing the door. In the rest of the room were fragments of pots and vessels of all sorts, heaps upon heaps. We hardly found a whole one there. We did, however, secure some, and of different patterns from any I have seen before; and among other things some covers to pots, — rare things. I found also several iron instruments; but they were too far gone by rust to make them out. Lastly, some bones made their appearance. I think there were bones all through the soil, but crumbled, so as to leave only a white powder. We got out one of the big pots, and, tying it to two beams, the men, some half-dozen, brought it home. I came home late to breakfast, and returned immediately after, having a shady place under ground. I staid until four, eating lunch in the cromlech; and then went home to dinner. I worked hard all day, and am pretty decidedly tired to-night: so you will give me credit for writing at once. I think the broken pots, etc., are evidences that the place is a family tomb, or was; and that the pots were broken or disarranged by persons entering to make fresh deposits. But such enormous slabs of stone! The room faces exactly east; and the slabs are six feet wide by seven or eight high, the end ones three feet wide by seven high. There is no place short of a mile whence they could have been brought.

FROM AN ACCOUNT GIVEN IN THE MISSION "TAPAL BOOK" BY THE REV. D. C. SCUDDER.

I have just returned this morning from a visit of exploration to remains near this bungalow (Periakulam); and it has occurred to me that it would be worth while to jot down in these pages the facts which have already been brought to light upon the antiquities of this Madura district by members of the mission. By means of a little Yankee inquisitiveness, and a trifling expense of time and money, we may be able to throw some light upon the vexed question of the ancient inhabitants of India.

I propose to arrange the remains already discovered under three heads, adopting terms already in common use, employed by writers on Celtic remains in Great Britain, and, I think, not inapposite to these.

I.—*Barrows.* A mound of earth surrounded by rough, bowlder-like stones, forming a rude circle of about twelve to twenty feet in diameter. These have been found in Dindigal and Periakulam. In Dindigal, we found large numbers of them spread over a large area. In Periakulam, I have found half a dozen in a row, at a little remove from each other, on the Tope Road, half a mile or more from the house, and again about three miles toward the tope; others upon the west side of the road. Within these circles are found the two other kinds of remains.

II.—*Cromlechs.* These are buildings formed of enormous stone slabs, usually six inches thick: in a perfect one, there are always two such upright slabs, about six feet long and of varying height, planted perpendicularly in the ground, at a distance of three feet from each other, and one end closed by another slab of the same dimensions. These slabs are always present if the building is in a tolerable state of preservation. The cromlechs are found upon the Pulneys and also upon the plains. They have been discovered at Dindigal, at Pulney; and to-day I have found some in this place. Those examined upon the hills had a large slab over the structure, and a corresponding one below. Nothing was found within and nothing below the lower slab. No stone has, I believe, been found at the bottom of the cromlech on the plains; but the top stone is occasionally present. The cromlechs found upon the plains, however, are not empty. Both at Dindigal and Periakulam were found within the cromlechs, as within the barrows, the third class of remains; viz.,—

III.—*Cairns.** These are large earthen pots, varying in shape and size: some only two or three feet in depth; others large enough to admit a man, as I proved this morning. These have been found at Dindigal, Mânâ Madura, Pulney, Periakulam, and Battalagundu stations. Within them are found various styles of small earthen vessels,

* The application of this term to the urns is evidently a mistake.

differing both in pattern and method by which they were formed from those in common use now. The pots opened at Mânâ Madura disclosed bones mixed in with the soil that had worked in, and, in one case, the remains of a skull held in a saucer-like dish. In those opened at Periakulam have also been found bones in a good state of preservation, — part of a jaw with teeth of an old person, and part of a skull, not found, however, in any cup. The number and variety of patterns of vessels found at Periakulam was beyond that of those exhumed at Mânâ Madura; but some of the same style were also found. Two kinds of pottery-work have been found in the latter place, whose object is doubtful; and accordingly I will sketch an outline of them.

No. 6 * was found at Mânâ Madura of different sizes; and in one or two cairns a small vessel was placed upon it. It appears to be a stand, as there is an opening through it; but, in a cairn opened to-day, No. 3 was found as if just fallen off the other. Mr. Capron will perhaps recognize No. 3 as a whole specimen, the top of which we found at Mânâ Madura. The base is hollowed out, and there is a small orifice through the neck. At Periakulam, pieces of iron have been found in the cairns. One which I have is much eaten by rust, and appears to be a rough knife-blade seven inches long. At Mânâ Madura, many vessels were found arranged around some of the cairns, embedded in the soil. One cairn at Periakulam has a thick stone as cover. No other cover has yet been found.†

Barrows, cromlechs, and cairns are related to each other, as the above facts prove. The same people constructed all three. They lived on the hills as well as on the plains. Their pottery was finer than that made in the same localities now. Their customs of interment differed from those common now. It is somewhat singular that the common talk respecting these remains should be identical in places so remote from each other as Mânâ Madura and Periakulam.

Prof. Daniel Wilson remarked that a distinction should be made between the cromlech and the megalithic cyst, to which latter class the structures described properly belonged: the former being applied particularly to those rude structures of stone built above the excavated chambers in which the remains of the dead were interred; and the latter to similar structures, in which themselves, the bodies, were placed, and the whole buried beneath a mound of earth. The pottery exhibited was of a much more elegant pattern and delicate workmanship than that discovered in similar structures in the north of Europe; while one piece, exhibiting a distinct lip, reminded him somewhat of the Saxon pottery of the sixth and seventh centuries.

* The numbers as given here refer to the figures on p. 361.

† Mr. Capron speaks of covers to the urns, and draws one of them as represented in fig. 1: his other figure, of the narrow-mouthed jar, was coverless.

Dr. Charles Pickering remarked that the Feejees made their pottery by hand, of very elegant shapes, and so uniformly rounded that one could hardly distinguish it from that formed on the potter's wheel. It was done by inserting the hand, grasping a smooth stone, into the mouth of the unformed vessel, and hammering upon it, by means of another stone, on the outside.

The following papers were presented:—

Description of a New Variety of Parus from Yarmouth, Nova Scotia, by Henry Bryant, M.D.

The specimens of Parus hudsonicus from Yarmouth and those from the Hudson-Bay territory present as great, if not greater, differences in size than exist between P. carolinensis and P. atricapillus; and in color, between P. septentrionalis and P. atricapillus. I am inclined myself to consider P. atricapillus, septentrionalis, meridionalis, and occidentalis, as varieties of one species; but, if they are considered as specifically distinct, there can be little question of the propriety of separating the Yarmouth bird from those found in the Hudson-Bay territory. The following description is based on five specimens, including a family of male, female, and the young; and were all procured at Yarmouth, Nova Scotia, on the 7th of July.

P. hudsonicus; var. littoralis.

Form, similar to P. hudsonicus.

Dimensions. ♂ adult. Length, .120;* extent, .180; wing from flexion, .58; tail, .57; tarsus, $.16\frac{1}{4}$; middle toe, .9; middle toe claw, $.6\frac{1}{2}$; hind toe, $.5\frac{1}{2}$; hind toe claw, .8; outer toe, $.8\frac{1}{2}$; outer toe claw, .5; inner toe, $.7\frac{3}{4}$; inner toe claw, $.5\frac{1}{4}$; bill, along ridge, .10; gape to top of lower mandible, $.11\frac{1}{2}$; depth of bill, $.3\frac{1}{2}$; breadth of bill, $3\frac{2}{3}$; length of nostril, $\frac{2}{3}$; breadth of nostril, $\frac{1}{2}$.

Colors. Nasal plumules, lores, and a narrow frontal line, brownish black; crown and hind neck, faded yellowish-brownish ash, shaded abruptly on the forehead into the narrow dark frontal line. A conspicuous but indistinct white stripe extends from the base of the upper mandible to the posterior portion of ear coverts, covering the whole cheeks and ear coverts, though gradually shaded on the latter into the ash of the head and hind neck; back, scapular, and rump, dirty ash; upper tail coverts, same as back, but slightly lighter; wings and tail, slaty wood-brown, with the outer webs of all the remiges, except the first and second, narrowly margined with white, and of the rectrices with light slate; throat and fore neck, sooty black; breast and abdomen, white; hypochondriacs, dull ferruginous; vent and crissum,

* Millimetres.

light dirty ferruginous, shaded gradually into the darker color of the hypochondriacs; tibiæ, ashy: under surface of wings and tail, pale wood-brown, with the inner webs of all the remiges except the first, conspicuously margined with white, broadest next the base, occupying the basal half of the second, and gradually encroaching on the other, so as to extend the greater part of their length.

♀ adult resembles the male in dimensions and color.

Young, not quite fully fledged, though able to fly: present the usual character of young birds in the downiness of the feathers, shortness of the bill, and apparent large size of the legs and feet. The dark color of the lores and frontal line is quite distinct: the whole upper parts brownish ash, darker than in the adult, and with scarcely an indication of any difference in color on the crown. The whitish stripe on the side of the head is prolonged so as to form an interrupted collar, though in its posterior portion appearing as a slight wash of hoary rather than white: beneath, the rufous is less distinct.

Remarks on the Genus Galeoscoptes Cabanis, with the Characters of two new Genera, and a Description of Turdus plumbeus Lin. By Henry Bryant.

The genus Galeoscoptes, including Turdus rubripes Temm. and Turdus plumbeus Lin., was established by Cabanis, on Turdus carolinensis Lin., which had been already placed in the genus Mimus of Boie. I have been unable to procure the original description of the genus in the Museum Heineanum, but presume that the same characters are given by Prof. Baird in the ninth volume of the Pacific-Railroad Report. These only consist in the wing being considerably shorter than the tail in Mimus, and slightly shorter in Galeoscoptes. On comparing specimens of the types of the two genera, of as nearly as possible the same size, I find this difference to be very slight. The bill is, however, rather straighter, and less distinctly notched, in Galeoscoptes: and the tarsus is shorter relatively to the middle toe, and has the divisions of its anterior face less strongly marked.

It would have been, in my opinion, preferable to have left the three birds in the genera in which they had been placed: but, as the genus Galeoscoptes has been generally accepted by ornithologists, it will be necessary to separate from it Turdus plumbeus and Turdus rubripes, and to make each of them the type of a genus, the affinity of the three birds being very slight. In order that the differences between these three genera, and also between them and Mimus, can be more readily seized, I give below a brief synopsis of the four genera in a tabular form: —

	Bill.	Wing.	Tail.	Tarsus.
Mimus Boie, type Turdus polyglottus Lin.	Shorter than the head, slender, a little higher than broad opposite the nostril: the upper mandible curved gently from the base, more abruptly toward the tip, the sides slightly but suddenly compressed anterior to the nostrils, and distinctly notched near the tip; under mandible, with the gonys, straight, and as long as the bare portion of the rami; the angles scarcely seen; rictal bristles more than half the length of culmen.	Rounded; first primary a little more than half the length of second, and rounded at the tip; fourth and fifth equal and longest; third scarcely shorter; second shorter than eighth.	Longer than wing, as 9 to 8. Considerably graduated; the central feathers to the outer as 67 to 50.	Longer than the middle toe and claw, as 39 to 35; five distinct divisions on its anterior face; outer toe and claw about equal to inner toe and claw.
Galeoscoptes Cabanis, type Turdus Carolinensis Lin.	Nearly as in Mimus; a little straighter, and less distinctly notched.	Rounded rather more than in Mimus. First quill one-half of second, and rounded at tip; fourth and fifth equal and longest; third relatively shorter than in Mimus; second shorter than ninth.	Longer than wing, as 16 to 15. Central feathers to outer as 63 to 52.	Scarcely longer than middle toe and claw, as 33 to 32; five divisions on its anterior face, less distinct than in Mimus; outer toe and claw distinctly longer than inner toe and claw.
Mimocichla* Sclater, type Turdus rubripes Temm.	As long as the head stout, a little broader than high opposite the nostril; scarcely if at all compressed laterally anterior to the nostril, and strongly notched; culmen gently curved from the base, and less suddenly toward the tip than in Mimus; gonys slightly ascending, longer than the bare part of ramus, and with the angle scarcely seen; rictal bristles strong, one-half the length of culmen.	Rather pointed. First quill a little more than one-third of second, with the tip acuminate; fourth and fifth equal and longest; third slightly shorter, and longer than sixth; second longer than seventh.	Shorter than wing, as 75 to 79; central feathers to outer as 70 to 57.	Longer than middle toe and claw, as 47 to 43, with only two faint transverse divisions on its anterior face; outer toe and claw decidedly longer than inner toe and claw.
Mimokitta,† type Turdus plumbeus Lin.	As long as head, strong; a little higher than broad at the nostrils; somewhat cultrate, scarcely if at all compressed laterally anterior to the nostrils, and very indistinctly notched; culmen nearly straight for one-half of its length, then gently curved to the tip; gonys ascending, shorter than the bare portion of rami; rictal bristles one-fourth the length of culmen.	Somewhat pointed. First quill one-third of second, rounded at tip; fourth and fifth equal and longest: third and sixth equal and slightly shorter; second longer than eighth.	Shorter than wing, as 69 to 72; central feathers to outer as 69 to 60.	Considerably larger than middle toe and claw, as 47 to 38; two very indistinct divisions on its anterior face; outer toe and claw decidedly longer than inner toe and claw. Claws shorter and straighter than in Mimocichla.

It will be seen by the above table, that Mimus and Galeoscoptes agree in the rounded wings, slender bill, and distinct division of the

* Sclater, in his monograph of the American thrushes, in the *Proceedings of the Zoological Society* for 1859, p. 323, proposed this as a sub-genus of Galeoscoptes, but gave no characters. The name is a very appropriate one; the type certainly resembling a thrush, at least as much as a mocking bird.

† From Mimos and Kitta.

scales of the anterior face of the tarsus, while they differ principally in the shorter tarsi of Galeoscoptes. Mimocichla and Mimokitta, while they agree in the more pointed wing and almost obsolete division of the anterior face of the tarsus, differ strikingly in the thrush-like bill of the first, compared with the scarcely-notched cultrate bill of the latter. The pointed first primary of Mimocichla also shows its greater affinity to the thrushes.

Mimokitta plumbea.

Syn. Turdus plumbeus Lin.
Galeoscoptes plumbeus (Lin.) Cab.

I have been induced to give a detailed description of this bird, as I have been unable to find any description of it except Catesby's, which is not perfectly accurate. Linnæus, although founding his Turdus plumbeus on Catesby's description, in all the editions except the tenth, refers also to the Tilly of Buffon, Mimocichla ardosiacea (Vieill.), and describes the bird as having a red bill. Brisson, though usually so accurate, confounded it with the same bird. Vieillot, in his description of Mimocichla ardosiacea, says, that if the description of the bill in Catesby is correct, which he doubts, the bird must have been a variety. Bonaparte, in his "Conspectus," gives Turdus ardosiaceus of Vieillot as a synonyme, as does also Sclater in his "Synopsis of American Thrushes." During my brief residence in the Bahamas, I unfortunately saw but few individuals of this species; and, in consequence of the nature of the places frequented by them, their habits were not easily observed. What I did see, however, reminded me most forcibly of the Florida jay. They were in precisely the situations that the latter bird would have chosen if removed to the Bahamas,—tangled thickets, where the original growth had been cut off, closely resembling the scrub-oaks of Florida, among which the Florida jay is always found. Although the mocking-bird is quite abundant in the Bahamas, the present bird is not called, at least I have never heard it called by the inhabitants, mocking-bird, but either blue jay or blue thrasher; which would indicate that its habits must differ from those of the former bird.

Dimensions. — Length, 274.* Extent, 370. Wing, from flexure, 117. Length of tail, 112; tail beyond wing, 83. Tarsus, 35; middle toe, 20; middle-toe nail, $7\frac{1}{4}$; hind toe, 12; hind-toe nail, $9\frac{1}{4}$; outer toe, $15\frac{1}{2}$; outer-toe nail, $6\frac{1}{4}$; inner toe, 14; inner-toe nail, $6\frac{1}{4}$. Bill along ridge, 25. Gape, 31. Depth of bill,† $6\frac{1}{2}$. † Breadth of bill, $6\frac{1}{4}$. Length of nostril, $3\frac{1}{4}$. Breadth of nostril, $4\frac{1}{4}$. Difference in length of tail feathers, 14.

Color. — Bill, black. Mouth and naked part of eyelids, bright orange.

* The measurements are in millimetres. † Opposite nostril.

Head and neck above back, rump, and tail coverts, lead-color, lightest toward the tail, and with the feathers of the head narrowly streaked in the centre with blackish, not extending to their tips. Lores black; this color washed, as it were, under the eye to its posterior margin. Wing, with the remiges and coverts, varying from brownish-black on the outer primaries to black on the inner secondaries and coverts; all the remiges but the first and second, and the greater coverts, margined with lead-color, lightest on the outer greater coverts. This margin is quite narrow on the third primary, and becomes gradually broader to the secondaries, on which, as well as on the coverts, it runs round the tips, and a short distance on the inner webs. The smaller coverts are broadly margined all round with lead-color of a darker hue than that of the greater coverts. The effect of this coloration is that the closed wing appears lead-color, with its outer border, a few longitudinal narrow stripes on the outer primaries, and their exposed tips brownish-black, and with two or three conspicuous black spots on the exposed portion of inner secondaries. Tail, blackish-brown: all the feathers with the outer webs margined with plumbeous at the base, scarcely seen on the outer and gradually becoming more conspicuous on the inner ones, where it extends for nearly one-half their length, and is distinctly serrated on its inner edge: all the feathers are tipped with light, scarcely seen on the inner ones, and extending on the outer ones for more than one-fourth of their length. These tips are entirely light-plumbeous on the inner feathers, and white on the inner webs, and plumbeous on the outer webs of the others. Chin, and feathered part of rami of lower mandible, white; extending on the latter to little beyond the anterior edge of eye, and then disappearing gradually. Throat black, interdigitating with the white of the chin by three short prolongations somewhat like the letter W. Fore-neck, breast, abdomen, flanks, tibiæ, and crissum, plumbeous, lightest on the centre of abdomen, and gradually shaded into white on the vent. Tarsi and toes red, dusky on the latter. Claws, horn-color.

The following letters were read, which have been recently received; viz.: —

From the Académie Royale, Bruxelles, Oct. 18, 1862, the Naturforschende Gesellschaft des Osterlandes, Altenburg, July 15, 1863; the Leeds Philosophical and Literary Society, Aug. 31, 1863; the Royal Scottish Society of Arts, Edinburgh, Sept. 1, 1863; and the Geological Society of London, Nov. 4, 1863, — acknowledging the receipt of the Society's publications; from the Société Royale des Sciences de Liége, May 1, 1863; the Linnæan Society, London, July 15 and 28, 1863, — acknowledging the same, and asking that missing numbers may be supplied; the Naturwissenschaftlicher Verein, Hamburg, Jan. 15, 1863, and the Société Royale de Liége, May 1, 1863, presenting their publications.

Mr. John Brown of Hamilton, Canada West, was elected Corresponding Member.

Dr. Henry M. Saville, and Messrs. Charles Stoddard, G. Hubbard Davis, jun., Stuart M. Buck, F. H. Peabody, and E. S. Atwood of Boston, and Mr. James O. Treat of Lawrence, were elected Resident Members.

DONATIONS TO THE MUSEUM.

Oct. 21. 345 specimens of 108 species of fishes, by the Museum of Comparative Zoölogy, the species of which were determined by Mr. F. W. Putnam. A keg of alcoholic specimens, mostly reptiles, from Manchester, New Jersey, by Mr. T. J. Whittemore. Specimens of *Matricaria inodora* and *Sedum rhodiola* from North-eastern Maine, by Mr. A. E. Verrill.

Nov. 4. A live alligator, from the mouth of the Mississippi, by Miss Langley. Limestone filled with crinoids and other fossil remains, from Davenport, Ia., by Mr. J. J. Dixwell.

Nov. 18. A collection of shells, by Mrs. B. D. Greene. Two crania of the musk-ox, by Mr. William Beetle.

Dec. 2. A collection of specimens of iron-ore from Marquette, Mich., by Mr. Francis Kidder and Dr. John C. McKenzie. Corals from the Florida Keys and the Sandwich Islands, by Mr. S. H. Scudder. Two crania of *Lophius Americanus* from Cape Cod, by Dr. B. J. Jeffries. Skins of *Tamias 4-vittatus*, *Arvicola xanthognathus* (3), *Spermophilus Parryi*, and *Mustela Americana*, from the Hudson-Bay Territory, and of *Spermophilus Harrisii* from Cape St. Lucas, by the Smithsonian Institution.

Dec. 16. *Uria arra* and *Harelda glacialis* from this vicinity, by Dr. B. J. Jeffries. A collection of 250 birds from Europe and Africa, by Dr. Henry Bryant. A full collection, 120 in all, of Kenngotts's Crystalline forms, by Mr. W. T. Brigham.

BOOKS RECEIVED DURING THE QUARTER ENDING DEC. 31, 1863.

Rules for Zoölogical Nomenclature. By H. E. Strickland. 12mo. Pamph. Edinburgh, 1863. *From the British Association for the Advancement of Science.*

Remarks on the Genus Lutra. By George Barnston, Esq. 8vo. Pamph. 1863. *From the Author.*

Salmon Fisheries of the St. Lawrence. By Richard Nettle. 12mo. Montreal, 1857. *From the Author.*

Observations on certain North-American Neuroptera. By H. Hagen, M.D.; translated from the French, with notes, etc., by Benj. D. Walsh. 8vo. Pamph. 1863. *From B. D. Walsh, Esq.*

Remarks on some Characteristics of the Insect Fauna of the White Mountains, N. H. By Samuel H. Scudder. 8vo. Pamph. Cambridge, 1863. *From the Author.*

On the Embryology of Asteracanthion berylinus Ag., &c. By A. Agassiz. 8vo. Pamph. *From the Author.*

On California Mosses. By Leo Lesquereux. 4to. Pamph. *From the Author.*

Flora Brasiliensis. Fasciculi 33, 34, 35. Folio. 1863. *By the Greene Bequest.*

Recherches sur l'eau dans l'intérieur de la Terre. Par M. Delesse. 8vo. Pamph. Paris, 1861. *From the Author.*

Bear-Valley Coal-Company Reports. 8vo. Pamph. Boston, 1863. *From C. W. Scudder, Esq.*

Tenth Annual Report of the Massachusetts Board of Agriculture. 8vo. Boston, 1863. *From the Secretary.*

A Decimal System for Libraries. By Nath. B. Shurtleff. 4to. Boston, 1856. *From the Author.*

Mittheilungen aus dem Osterlande. Band 16. Heft 1–3. 8vo. Altenburg. *By Exchange.*

Monatsberichte der K. Preuss. Akademie der Wissenschaften zu Berlin. Jahre, 1862. 8vo. Berlin, 1863.

Der Zoölogische Garten. IV Jahrg. Nos. 1–6. Frankfurt am M. 8vo. 1863.

Jahrbuch der K. K. geologischen Reichsanstalt. 1863. xiii. Band. No. 2. 8vo. Wien, 1863.

Wochenschrift Vereines zur Beförderung des Gartenbaues in der Königl. Preussischen Staaten für Gärtnerei und Pflanzenkunde. Nos. 1–30. 4to. 1863. Berlin.

Archiv für Naturgeschichte. Vol. xxviii., No. 5; and vol. xxix., No. 1. 8vo. Berlin, 1863.

Schriften der K. Physikalisch-Okonomischen Gesellschaft zu Königsberg. Dritter Jahrgang. 1862. Erste Abtheilung. 4to.

Abhandlungen aus dem Gebiete der Naturwissenschaften in Hamburg. iv. Band. 3 Abth. 1862.

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ERRATA.

Page 6, line 35, for "corresponding" read "resident."

Page 7, line 2, for "part iv." read "part iii."

Page 33, dele lines 19–25.

Page 33, line 30, for "Heliastrea" read "Heliastræa."

Page 46, line 17, for "James Freeman Allen" read "Henry Freeman Allen."

Page 47, line 17, for "window" read "green bottle."

Page 58, line 21, for "valves" read "halves."

Page 64, line 13, for "Naturgesellschaft" read "naturforschenden Gesellschaft."

Page 70, line 5, for "generally" read "generically."

Page 112, line 50, for "Henry Greene" read "Henry Grew."

Page 123, line 30, for "common" read "rare."

Page 123, line 39, for "Sphyrapicus" read "Sphyropicus."

Page 125, line 24, for "common" read "rare."

Page 128, line 17, for "semipalmalus" read "semipalmatus."

Page 129, lines 36–39, for "Fulix" read "Fulica:" the lines should follow Porzana Carolina.

Page 158, line 16, for "Mitchell S. Weir" read "S. Weir Mitchell."

Page 186, three lines from bottom, for "Brazil" read "Bombay," and for "A" read "L."

Page 231, line 14, for "montanus" read "Montinus."

Page 235, line 20, for "Whittlesy" read "Whittlesey."

Page 249, line 32, for "Limnacidæ" read "Limnæidæ."

Page 250, lines 1 and 24, for "Ancyliformis" read "ancyliformis."

Page 252, line 2, for "Epephragm" read "Epiphragm."

Page 280, line 35, for "Hamblin" read "Hamlin."

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